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CONTENTS

CLINIC OF DR. A J OCHSNER

Augustana Hospital

CARCINOMA OF THE BREAST: DIAGNOSIS, INDICATIONS FOR OPERATION, AND TECHNIC OF THE RADICAL CURE

Summary Signs and symptoms of carcinoma of the breast—the wisdom of removing every new growth—wide-spread metastases following massage or too frequent examination, details of the radical operation, accidents and complications—how to avoid them—the value of gauze dissection, closure of the wound without tension on the flaps—the dressings and after treatment, use of Röntgen ray, when to apply skin-grafts—the technic—precautions to be observed—the wire-basket dressing

HISTORY

THE patient, a single woman of forty-one, by occupation a teacher, was admitted to the hospital October 8, 1916, because of a mass in the left breast

Her family and past histories are negative Menstrual history is also negative Habits are good There has been no loss of weight

In the summer of 1915 she noticed a slight retraction of the left nipple, which has been gradually increasing A hard nodule beneath the nipple was noticed a few weeks later, which has slowly increased in size About one month ago she began to have sticking pains in the breast There has been no discharge from the nipple She has nursed two children normally. She does not remember ever having been struck in this region. Five or six years ago she was treated for goiter, with good result.

PHYSICAL EXAMINATION

The patient is a well-developed and well-nourished woman with good color The tonsils are hypertrophied and there are

a number of patulous crypts   The eyes react to light and ac
commodation   There is a slight symmetric diffuse enlargement
of the thyroid gland   but there are no signs of pressure or of
hyperthyroidism present   The heart and lungs are negative
The nipple of the left breast is almost completely buried due
to the retraction   The breast is quite firm beneath the nipple
for a distance of 1 inch and in this region can be palpated a
hard slightly tender infiltrating mass attached to the nipple
and to the underlying breast tissue   There is a slight moisture
about the nipple   No other masses are palpable in either breast
There is a small hard lymph gland palpable deeply in the left
axilla   Otherwise the examination is negative

COMMENTS AND OPERATION

DR OCHSNER (October 9 1916)   This is a very early car
cinoma of the breast   You see the retraction of the nipple
There is an area here of only about 3 cm that is indurated
We never leave a growth in the breast under any condition
because we have seen a very large number of cases in which an
apparently harmless growth was left for a number of years and
then suddenly without any apparent good reason—probably
after some little traumatism—the condition changed into a
malignant condition   On the other hand of all the non malig
nant growths which we have removed early before there was
any suspicion of malignancy none of those that we have had
the opportunity to follow up have ever suffered from malig
nancy   Therefore on one hand we have the experience of a
great many cases in which these growths have been left and in
which malignancy has occurred   and on the other hand we
have a great many cases in which these growths have been
removed and in none of them has malignancy occurred   It
would consequently be wise to do just what we are doing—
remove every growth of the breast

It is in cases just like the one before us that the surgeon
has the greatest responsibility because if the operation is per
formed with the same thoroughness that a surgeon would em
ploy were he dealing with an advanced case   the patient is

practically certain to remain free from recurrence. On the other hand, if the surgeon decides to make a very limited operation because the palpable tumor is so small, then the patient is practically certain to die as a result of the occurrence of metastatic growths.

There are several very definite dangers to which a patient in the condition of the one before us is exposed. The first of these lies in the tendency that many surgeons have of manipulating these growths many times while they are trying to decide whether or not an operation is indicated. If the surgeon is violent in his manipulations, then the patient is very likely to die from metastatic growths in the liver or elsewhere in the body. During the early days of osteopathy I encountered a considerable number of cases that had been treated by osteopathic massage, in which, apparently, the infectious material had been set free as a result of these manipulations. During recent years the osteopaths no longer massage malignant growths, and for some years I have not encountered any of these cases.

We have observed a number of cases in which the growth remained stationary until the patient began to have it examined frequently, and, either as a matter of coincidence or as a result of the manipulations practised during these examinations, the patient reported that the growth had increased more within a few weeks than it had during many months previously. This was especially true in cases in which oils and liniments had been rubbed into the breast in the hope of reducing the size of the growth. It is, of course, possible that the fact of an increase in size had induced the patient to seek advice from the physician.

I would also strongly caution the doctor against removing a portion of the growth for the purpose of making a microscopic examination unless this were done by means of the electric cautery or the Paquelin cautery, because I have encountered many cases in which the removal of a small portion of a growth was followed by death of the patient from metastases.

Our usual incision is the one introduced by Dr. Rodman, as shown in Fig. 84. We begin far enough toward the median line with our incision so as to be quite sure of removing all of the

tumor tissue We make a vertical incision at right angles to
the arm which is extended in an upward and outward direc
tion Then we lay bare the axilla We do this notwithstanding
the fact that this growth is very small because it is just in these
cases that we have the best chance of permanent recovery pro
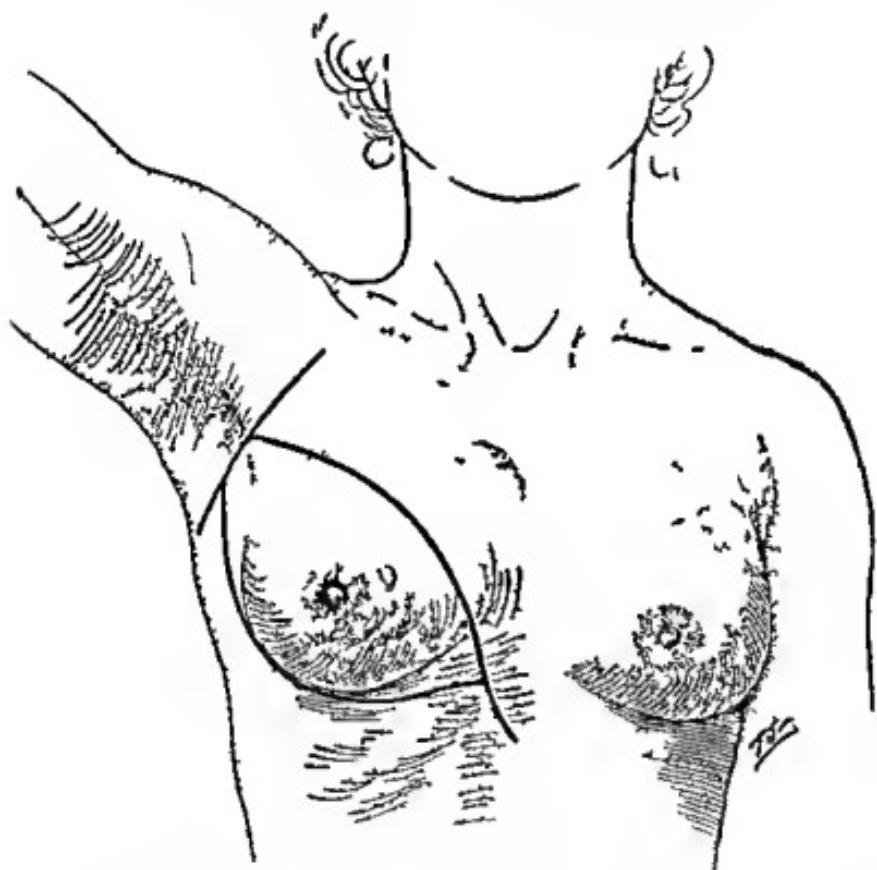
Fig 84—Rodman incision used including skin over the entire breast Note
transverse portion inferior to axilla Median end of incision extends to the xiphoid
process

vided the operation is performed with the same thoroughness
as if the case were far advanced We are careful to remove a
large piece of skin overlying the breast in order that we shall
not have recurrences in that tissue and for this reason the
lower incision is made 3 cm distant from the nipple We turn

back our skin flaps above and below the breast so that we may remove all the tissues beneath them that might contain carcinomatous material Every blood vessel is caught carefully, so that practically no blood is lost We are now dissecting up the pectoralis major muscle and as we proceed you can see how the vessels perforate the intercostal spaces Whenever possible one should grasp these blood vessels before they are cut It is of the very greatest importance to guard against pushing the hemostatic forceps through the intercostal space and so opening the pleura an accident which has frequently happened and is very likely to happen if one does not bear in mind its danger Such a puncture however can be easily and quickly closed with a mass of vaselin so as to prevent the occurrence of a pneumothorax In applying forceps one must guard especially against making traction after clamping them Many surgeons have a habit of making traction on hemostatic forceps after they have been applied in order to make sure that they have grasped the vessels in a satisfactory manner Ordinarily it may be perfectly safe but in this portion of the operation it is not at all safe because of the danger of tearing off the branches of the intercostal vessels which may retract and are very difficult to grasp after they have once been torn What has been said about the intercostal arteries applies to an even greater extent to the mammary artery and vein

Notwithstanding the fact that we have a very small tumor here we remove every particle of the pectoralis major muscle We have guardedly come down upon the pectoralis minor muscle and just where the pectoralis major crosses the pectoralis minor we always encounter this group of blood vessels— the pectoral branches of the acromiothoracic artery and vein and the long thoracic artery and vein These we grasp between two pairs of forceps and ligate at once for fear of tearing them and to prevent tearing a hole into the axillary vein Now I place my finger underneath the pectoralis minor muscle directly along the anterior surface of the vein so as to free this muscle from its attachment to the ribs It is now entirely separated I sever the proximal attachment to the ribs in this

way, and by lifting up the pectoralis minor muscle I expose the
entire remaining portion of the axilla   I remove all the fat in
the axilla by means of a gauze sponge   By rubbing this gauze
over the tissues I am able to remove every particle of fat and
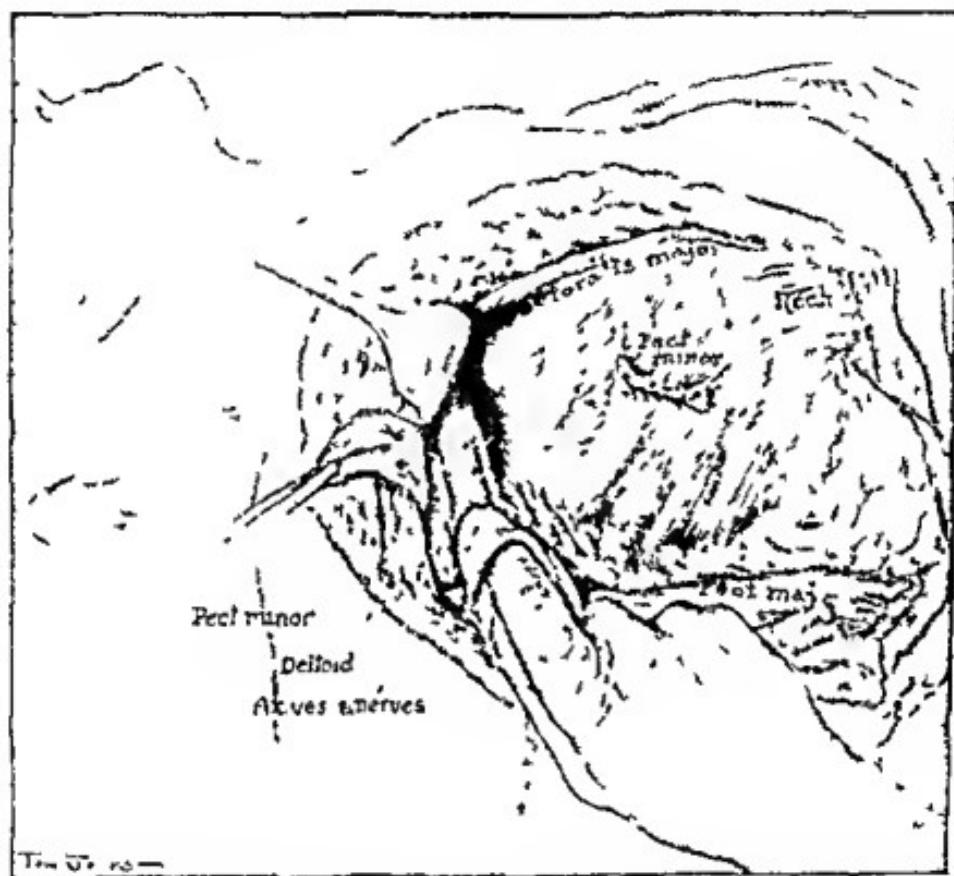
Fig 85—Showing method of clearing the axilla of all lymph glands and fat
by means of gauze dissection with the finger   The breast together with the pec-
toralis major has been dissected from the chest wall, beginning medially and con
tinued downward and laterally   The origin of the pectoralis minor muscle has been
severed

all the lymph-nodes, leaving the tissues in the axilla absolutely
clean (Fig 85)   The axillary artery and vein are exposed quite
up to the clavicle, exposing also the third portion of the sub-
clavian artery and vein   Every one of the little vessels is ex-
posed in this way by means of gauze dissection   Each vein is

then caught between two pairs of forceps, is sectioned between the forceps, and the end which remains attached to the axillary vein is at once ligated with very fine catgut ligatures. There is no operation in which careful manipulations are more important than here. If the surgeon is careless or shiftless in his manipulations he is certain to do mischief. If he pulls too hard, or if he is not careful in tying his sutures, or in making this gauze dissection he is liable to do harm that is difficult to repair. Should we, however, be so unfortunate as to injure the axillary vein, we should at once compress it above and below the point of injury and accomplish its repair with a series of fine silk sutures. We expect to have a perfectly functionating axillary vein as a result of this step. The method of suturing these veins was introduced by Dr. John B. Murphy many years ago, and I have practised it where the veins in this or in any other operation have been injured. I think we have only had 2 cases in my experience where the axillary vein was injured. However, we have had several experiences in which the deep jugular vein was injured in operations upon the neck, and in which the vein was repaired by the method I have just described.

In order to prevent unnecessary compression of the axillary vein following the operation, we cut off the proximal end of the pectoralis minor muscle, leaving the distal end attached, and so preserving a sufficient portion of the muscle to cover the axillary vein. We suture the cut end of this muscle to the intercostal muscles, and in this way effectually protect the axillary structures from cicatricial stricture. Since using this method we have had very few cases of postoperative edema of the arm. We have never had a recurrence of carcinoma in the stump of the muscle, although we have applied this method many times since it was first introduced by Dr. N. M. Percy, of our clinic, some fifteen years ago.

We have removed the entire breast together with the pectoralis major and the proximal end of the pectoralis minor and all the fat and lymph-nodes in the axilla (Fig. 86). When you look at this specimen (indicating the excised breast and contained tumor) you see we have a carcinoma that is less than 1 cm.

in thickness and not more than $2\frac{1}{2}$ cm in width You will also
notice these small, hard **shotty carcinomatous** axillary glands
One can see in this **wound** the intercostal muscles exposed
throughout the entire chest wall on this side The axillary
artery and vein are also exposed throughout their course except
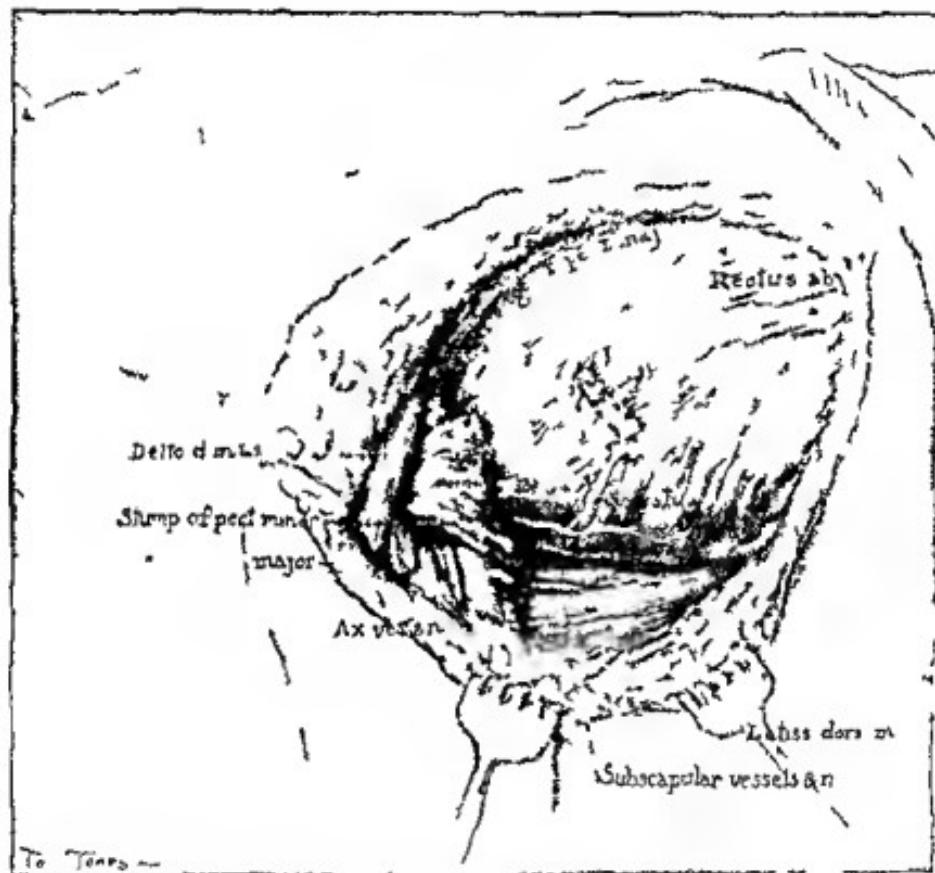
Fig. 86 —Breast removed Pectoralis minor muscle sutured so as to cover
axillary vessels Note the clean dissection of chest wall which can be obtained
only by gauze dissection

where covered by the pectoralis minor muscle We catch every
little vessel very carefully so that there can be no unnecessary
loss of blood and **no collection of blood** and serum beneath the
skin flaps

Drainage—In order to prevent the collection of serum
beneath these large skin flaps I make a small stab incision in

the middle of the axilla and just at the lowest corner of the wound. Through this incision I now pass two small split-rubber drainage-tubes One of these is placed near the axillary vessels and the other directed toward the epigastrium. These drains
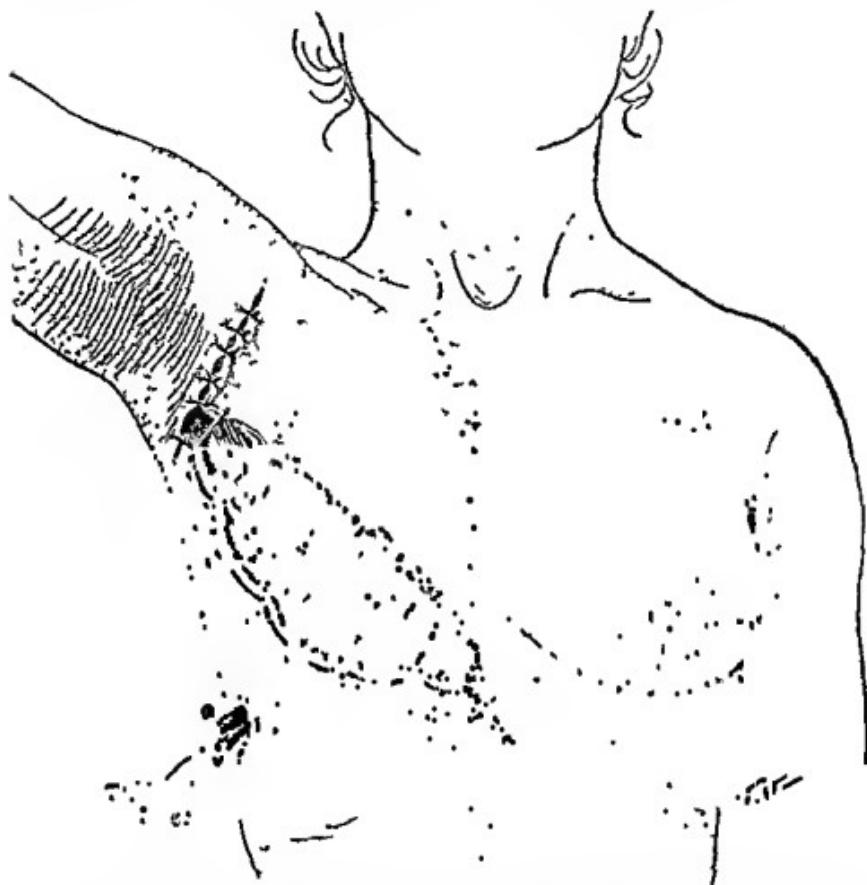
Fig. 87 —Showing wound closed with silkworm sutures Very little if any tension is made on the flaps because of danger of necrosis of the flaps Two split-rubber tube drains inserted through a stab incision in the lowest corner of the wound, one passed to the axilla and the other to the epigastrium.

will be removed on the third day, when there will have been fibrinous adhesions between the surfaces of the skin-flaps and chest wall, thus preventing the further collection of serum.

The flaps are now approximated as in Fig. 87 by means of a number of interrupted silkworm-gut sutures, great care being

taken to leave the edges of the wound at least 1 cm apart
By drawing these sutures tightly it would be possible to make
a perfect coaptation but the tension would result in interfer
ence with the arterial circulation to such an extent that little
new blood would be carried to the edges of the wound by the
return circulation   The lymphatic circulation would be inter
fered with to a much greater extent and as a result of this the
skin would soon become edematous and the free edges of the
flap being closely sutured there would be no possibility for the
accumulated lymph to drain away from the flaps, and un
doubtedly a considerable portion of each flap would become
necrotic and a large area would remain without skin covering

On the other hand by leaving the edges sufficiently apart
to permit the lymph to drain out of these flaps and at the same
time to make the tension not sufficient to prevent return cir
culation all the skin that has been left will remain and the
small space left between the edges of the wound will heal spon
taneously in a very short time   In cases in which the skin
flaps are even less able to cover the denuded surface it is quite
proper to leave a considerable portion uncovered   In the case
before us a triangular surface 4 cm wide at its widest portion
and 7 cm long as shown in Fig 88 will have to remain un
covered

In order to prevent the free edges of the skin flap from
curling in it is well to insert a few horsehair sutures between
the silkworm gut sutures   It is of the greatest importance in
these cases to avoid tension   At the conclusion of this opera
tion the wound does not look nearly so attractive as it would
had we applied a greater amount of tension and secured abso
lute coaptation of the wound edges but within a week only a
very small area of this wound surface will remain open while
in the other case by that time undoubtedly a large portion of
the skin flaps would be necrotic

In order to still further prevent the occurrence of edema
we make a series of small incisions extending almost but not
quite through the skin flaps in a parallel direction with the
line of sutures   This reduces the tension and permits the lymph

to escape at the same time   All of these small incisions will heal spontaneously within a short time

Application of Dressings —It is important to bear in mind the method of dressing these wounds   If only a small amount of dressing material is placed on these wounds, and this is held in place by means of a very tightly applied bandage, the pressure will interfere seriously with the circulation in the flap and may cause necrosis   It is therefore advisable to apply a very large dressing surrounded by a soft gauze roller bandage, applied with only sufficient tension to hold the dressing securely in place but not sufficiently tight to cause necrosis   The dressings should overlap every portion of the wound sufficiently so that they cannot be displaced by the moving about of the patient

After-treatment —The patient will be put to bed and will be permitted to drink freely of hot water   Normal salt solution will be given by means of the proctoclysis method introduced by Dr John B Murphy   She will be permitted to sit up in bed to morrow morning and to sit up in a chair outside of bed from twenty four to thirty six hours after the operation   The drainage tubes are removed on the third day   On the fifth to the seventh day the superficial sutures are removed and the deep sutures on the twelfth day

Röntgen Ray Treatment —This patient received an intensive x ray treatment yesterday and a second treatment this morning before the operation was begun   She will receive one further x ray treatment every day for the next four days, so that she will be given six intensive x ray treatments in this series   It is not necessary to fear any harm to the healing of the wound because of this x ray treatment as it does not seem to have any harmful effect whatever   Had we been able to close this wound entirely we would have given the patient another series of x-ray treatments two weeks after finishing the present series   It will however, be necessary to apply skin grafts to this wound and the application of x ray seems to interfere with the growth of skin grafts that have recently been applied   Consequently we will postpone the application of our skin grafts until the case has received a sufficient number of x ray

Tim Jones

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Fig 83
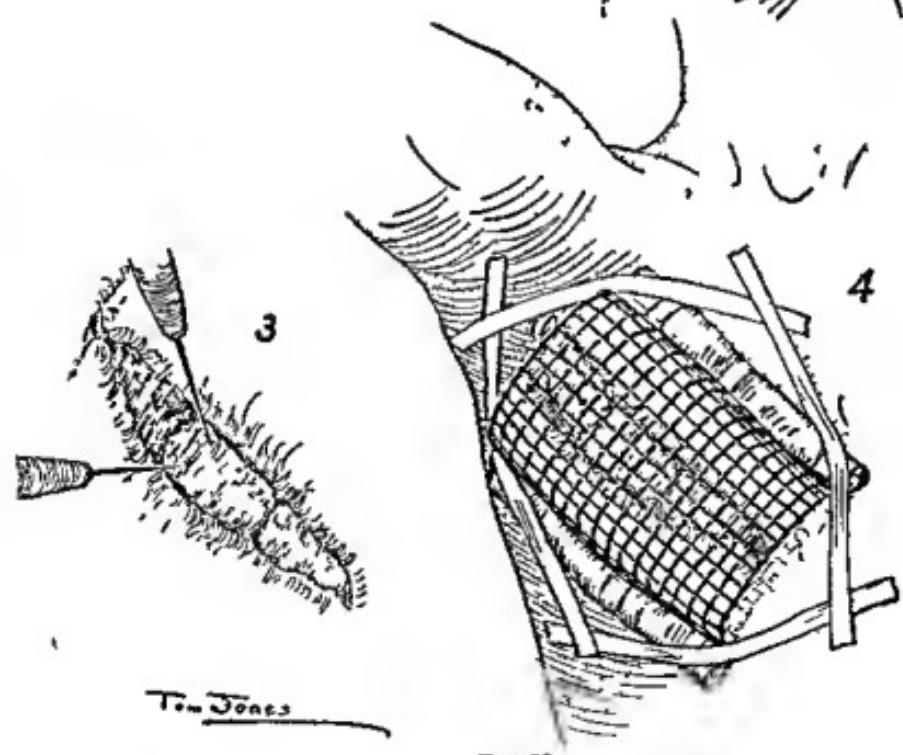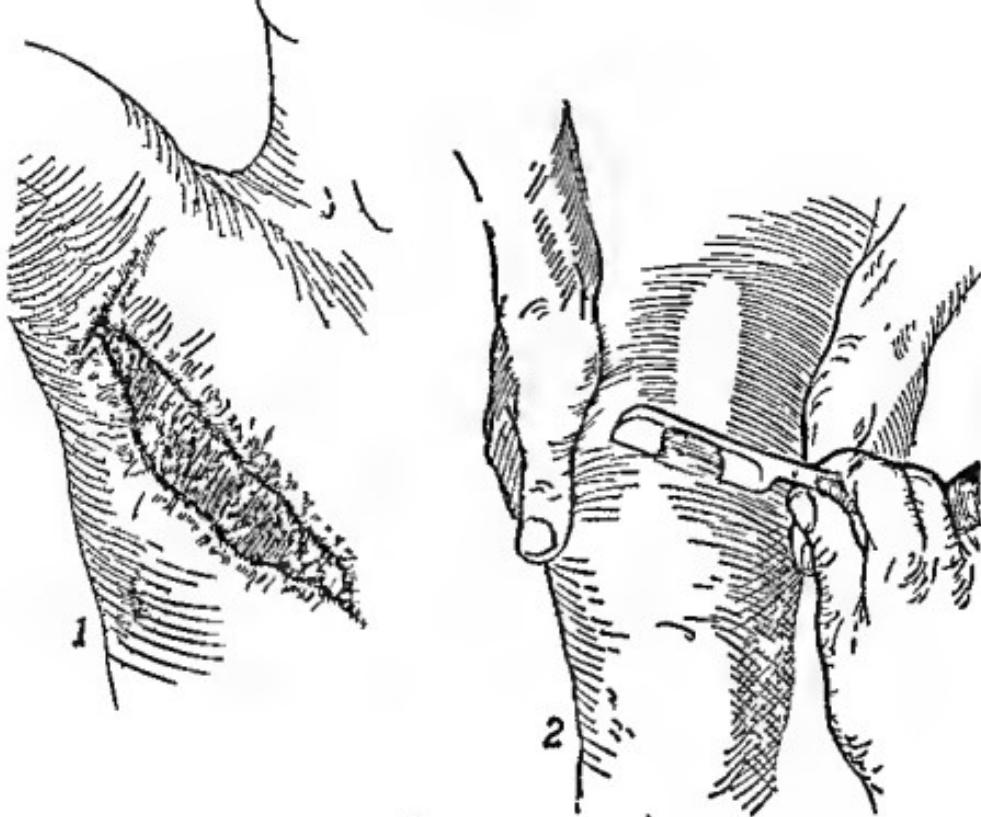
treatments to destroy any remnants of malignant tissue which might be left at the conclusion of this operation. Crile and others have insisted that x-ray is more effective in open wounds, and consequently we will permit this patient to rest for two weeks after the conclusion of the present series of x-rays, and then we will administer six more daily intensive x-ray treatments, after which time we will cover the raw surface with skin-grafts.

Comments by Dr. Ochsner (November 2, 1916).—*Skin-grafting.*—We have here a granulating surface, triangular in shape, 12 cm long and 2½ cm wide, as in Fig 88, 1. The surface is perfectly smooth and perfectly clean and the granulations are firm in character. Twenty-four hours ago the whole surface was carefully painted with strong tincture of iodin. At that time the granulations were not quite so smooth and even as they are at the present moment, so that we attribute the present condition to the action of the tincture of iodin.

For a number of years many surgeons recommended the removal of all of these granulations by means of a sharp curet, so that the grafts might be applied to the underlying raw surfaces. We have found, however, that our results are very satisfactory if the skin-grafts are applied directly to these granulations.

A surface of the skin from which the graft is to be taken on the outside surface of the patient's thigh is cleansed either by soap and water and alcohol, or by washing with benzin and applying tincture of iodin lightly to the surface, and later removing most of the iodin by means of a gauze sponge and alcohol.

Fig 88.—1, Wound three weeks after average breast amputation. Healthy granulations in base of wound. Ready for skin grafting. 2, Removing a thin layer of skin from the thigh by means of a razor. An assistant's hands on either side of the thigh stretch the skin taut. Note the graft collecting on surface of razor. The graft is then deposited upon the wound directly from the razor. 3, Spreading of the grafts over the wound by means of two needles. The graft is never lifted again from the surface. Care must be used not to cause bleeding by manipulation of the needles. 4, Wire basket, the edges covered with gauze, fastened by adhesive strips to the chest wall in order to protect the wound and grafts from dressings.

An assistant then stretches the skin between the two hands over the femur, as in Fig 88, 2 so that the portion to be cut is also lutely tense A very sharp razor, of the ordinary pattern used by barbers for shaving, is then placed at right angles to the femur, and by means of a quick sawing motion a strip of the desired width and length is obtained, the cut portion doubling up on the side of the razor

Care should be taken to cut just deeply enough to include the top of the papilla in the ribbon This produces only a very slight amount of bleeding, and the surfaces from which the grafts have been cut will be perfectly healed in a few days

Some years ago my brother made a very large number of observations in skin grafting in our clinic, and found that it was possible to obtain nearly 100 per cent of perfect results by cutting the skin grafts absolutely dry, using dry skin from which the grafts are cut a dry razor, and applying them to dry granulating surfaces He also found that by following this plan the edges of the ribbons of skin would unite so closely that it was impossible to determine where one ribbon began and the other ended We have followed this method for a period of twelve years in a very large number of cases and have found it very satisfactory

After a ribbon of sufficient length has been cut, the edge of the razor is tilted upward and by a few sawing motions the end of the ribbon is cut off and the entire ribbon has been piled up on the side of the razor

The spreading of this ribbon upon the raw surface is greatly facilitated by placing the razor flat upon this surface and with the blunt end of a fine needle pulling the edge of the ribbon which was cut last down upon the raw surface and sliding the razor over the raw surface while the ribbon is being drawn down upon this surface In this manner, by the time the last portion of the ribbon slides off the razor the spreading has virtually been accomplished There are little finger like projec tions along both edges of the ribbon which are likely to fold under the central portion By using two fine probes or two ordinary sewing needles held by their pointed ends in hemo

static forceps, and using the ends containing the eyes for spreaders, one can readily unfold the entire ribbon so that all of the little bands are spread to their fullest extent by holding the ribbon with one probe and pressing upon the surface of the edges with the other. As many ribbons of an appropriate length should be cut as are required to cover the wound. It is important to unroll all of these serrated edges to their fullest extent, because every one of these little projections will cover a surface with skin. It is not wise to try to lift up these little serrated edges, because one is likely to be unsuccessful and to injure the granulations and cause troublesome bleeding. Occasionally small air-bubbles form underneath the skin-grafts. These should be carefully pressed out so as to leave the graft in perfect apposition with the underlying granulations. Almost immediately the blood-vessels in the skin become filled with blood from the granulations and take upon themselves a pinkish appearance.

It is important not to dress the granulating wound with vaselin or any other oily substance immediately before skin-grafting is done, because the vaselin is likely to prevent the adhesion of the skin-graft to the granulation tissue, and in this way success will be prevented.

Dressing.—Many different methods of dressing have been employed, but we have found it most satisfactory to construct a basket-like apparatus out of wire-netting, sufficiently large to extend beyond the edges of the wound. Gauze pads are then folded and placed about the wound at a distance of 2 or 3 cm. and held securely in position by means of small rubber adhesive strips at a point at which the edge of the wire basket is intended to rest, so as to prevent discomfort and harm to the skin from pressure due to the edges of the wire basket. The latter is then placed over this surface in an inverted position so that there is a space of 3 or 4 cm. between the bottom of the basket and the surface of the wound. The basket is held in position by means of rubber adhesive plaster and then it is covered by means of gauze and cotton, which will prevent any contamination of the wound. The grafts in this manner are left in contact with the

granulating surface entirely free from dressings and thoroughly
protected from injury from without (Fig 88 4)   Within a week
they will have permanently covered the entire surface with
good skin   It does not seem wise however to apply x ray treat
ment for about a month   After this time it is safe to repeat this
form of treatment if it is indicated

INTRA-ABDOMINAL STRANGULATED INGUINAL HERNIA

Summary A patient, seventy seven years of age, who had had a right inguinal hernia for forty years and a left inguinal hernia for six years, was brought to the hospital presenting the signs and symptoms of intestinal obstruction A probable diagnosis of carcinoma of the sigmoid flexure was made and immediate relief was afforded by colostomy, twenty days later return of symptoms necessitated a second operation

Positive signs of intestinal obstruction, the importance of withholding cathartics, gastric lavage, choice of the anesthetic, the Moynihan tube—its value and the technic of its use, operative reduction of intraperitoneal strangulated hernia, details of the after treatment

History —A man, age seventy seven, was brought to Augustana Hospital on a stretcher September 2, 1916, complaining of abdominal pain and distention His family and past histories are negative

Present Trouble —Forty years ago, while lifting a heavy load, he noticed a bulging in the right groin which was aggravated by standing or coughing He has worn a fairly satisfactory truss on that side during the past forty years Six years ago he noticed a similar swelling on the left side, and since then has worn a double truss The rupture on the right side has occasionally slipped past the truss and he has had trouble at times in reducing both herniæ, but so far has always succeeded The right hernia, he says, never becomes larger than a hen's egg, and the left is somewhat smaller

Since about five years ago he has noticed that the stools were of very soft consistency and never were formed. At times he has passed red blood, which, he thinks, was due to his hemorrhoids He has lost about 7 pounds in weight during the past four years

Twelve days ago he had cramp-like pains in the entire lower abdomen, lasting about an hour and relieved by a bowel movement One week later he had a similar attack, which was relieved in the same way The next day, at noon, he went to

bed because he felt weak and dizzy but no pain The next day
he had pain and the bowels would not move although he had
desire Four days ago the abdomen became distended and he
became nauseated but did not vomit There has been no change
in the hernia and no pain in either groin At present he is
suffering with a grumbling pelvic pain with marked abdominal
distention and obstipation

Physical Examination —A well developed but emaciated
elderly man with an oily yellowish colored skin suggestive of
low grade toxemia Extremities cool and slightly cyanosed
Examination otherwise negative except for the abdomen and
groins

The abdomen is markedly distended and tympanitic No
definite points of tenderness can be found and no masses are
palpable Both inguinal rings admit tips of two fingers and
there is marked bulging upon coughing Both hernia however
are easily reduced Proctoscopic examination of 32 cm of
lower bowel is negative

Clinical Diagnosis —Obstruction of the large bowel probably
due to a tumor of the region of the sigmoid flexure of the de
scending colon Double inguinal hernia

Operation —September 2 1916 (directly after admission)

Under local anesthesia a loop of distended bowel was brought
through a small left rectus incision and a colostomy performed

On the next day much of the tympanitis had subsided
During a spell of coughing however a strangulation of his
right hernia occurred which was reduced with some difficulty
by an intern This hernia again became strangulated on Sep
tember 5th when it was again reduced From this time on for
two weeks the patient progressed normally The colostomy
acted satisfactorily and the patient was able to be up and
about taking nourishment fairly well and having no abnormal
symptoms On September 20th both of his hernia came down
during an exertion and the patient was unable to reduce them
without assistance The hernia were reduced by an intern
with only a moderate amount of difficulty and without causing
the patient an undue amount of suffering Following this the

patient complained of severe pain in the right lower abdomen and his distention began to increase. On September 22d he began to vomit quantities of intestinal contents, and it was decided to make another abdominal section in order to remove the cause of the obstruction.

COMMENTS BY DR. A. J. OCHSNER

The presence of continued distention and the absence of the passage of gas or feces through the colostomy opening, and particularly the vomiting of stercoraceous material, indicate positively that the patient is again suffering from intestinal obstruction. The patient's age, and the fact that three weeks ago we operated upon him for the relief of intestinal obstruction caused by a carcinoma in the lower end of the sigmoid flexure, has clouded the symptoms during the last two days. Had it not been for these facts I am confident that we would have recognized the existence of an intestinal obstruction twenty-four or thirty-six hours earlier. This source of error was still further increased by the presence of the colostomy opening, because this made it impossible for us to determine positively that there existed an absence of the passage of gas. The presence of the intestinal distention and the nausea should have impressed us with the seriousness of the condition, but the absence of visible peristalsis, which was probably due to the age and the reduced condition of the patient, and the absence of vomiting until some hours ago served to prevent our making a proper diagnosis earlier.

In cases of suspected intestinal obstruction the most important point to be borne in mind is the caution never under any circumstances to give a cathartic. The most that could be accomplished by the use of a cathartic would be the demonstration that an intestinal obstruction does actually exist. In the meantime irreparable harm may have been done to the patient by the increased pressure within the intestines above the point of obstruction, which may result in dangerous tension or even in perforation of this portion of the intestine. In these cases, if there is any doubt, it is always best to make an explora-

tory abdominal section unless the obstruction appears to be
due in all probability to a circumscribed inflammatory process
which can be determined ordinarily by a rise in temperature
and pulse and by an increased leukocytosis

In case it seems advisable to postpone an exploratory opera
tion for a short time it is best to cocainize the pharynx by the
use of a 2 per cent cocain spray permitting the patient to swallow
some of the saliva containing the cocain and then after waiting
five or ten minutes to perform gastric lavage with plain water
at a temperature of 105° F This may be repeated at intervals
of an hour until it is possible to perform the exploratory lapa
rotomy Ordinarily however it is best to operate immediately
upon making a probable diagnosis of intestinal obstruction

It is impossible to state in this case what may be the cause
of the obstruction Both inguinal canals are perfectly free
the herniæ having been reduced the last time about forty eight
hours ago

Operation —In a patient the age of the one before us who
has within a month undergone an operation for the relief of
intestinal obstruction lasting nearly four days who is not very
vigorous and shows his age to the full extent who has evidently
suffered from intestinal obstruction for approximately forty
eight hours although this obstruction may not have been
complete until about six hours ago it would seem unwise to
make use of a general anesthetic especially as we know from
our experience with the same patient three weeks ago that he
bears the administration of novocain splendidly

Not being certain of the cause of the obstruction it seems
best to make an incision in the median line between the umbilicus
and the symphysis pubis We consequently inject the skin
with ½ of 1 per cent solution of novocain containing 1 30 000 of
adrenalin The deep tissues underlying this line are then filled
with the same solution injected hypodermically After waiting
five minutes an incision is made down to the transversalis fascia
but not through it (Fig 89) This fascia is then also injected
with the same fluid and it is then possible to continue the
incision through the transversalis fascia and the peritoneum
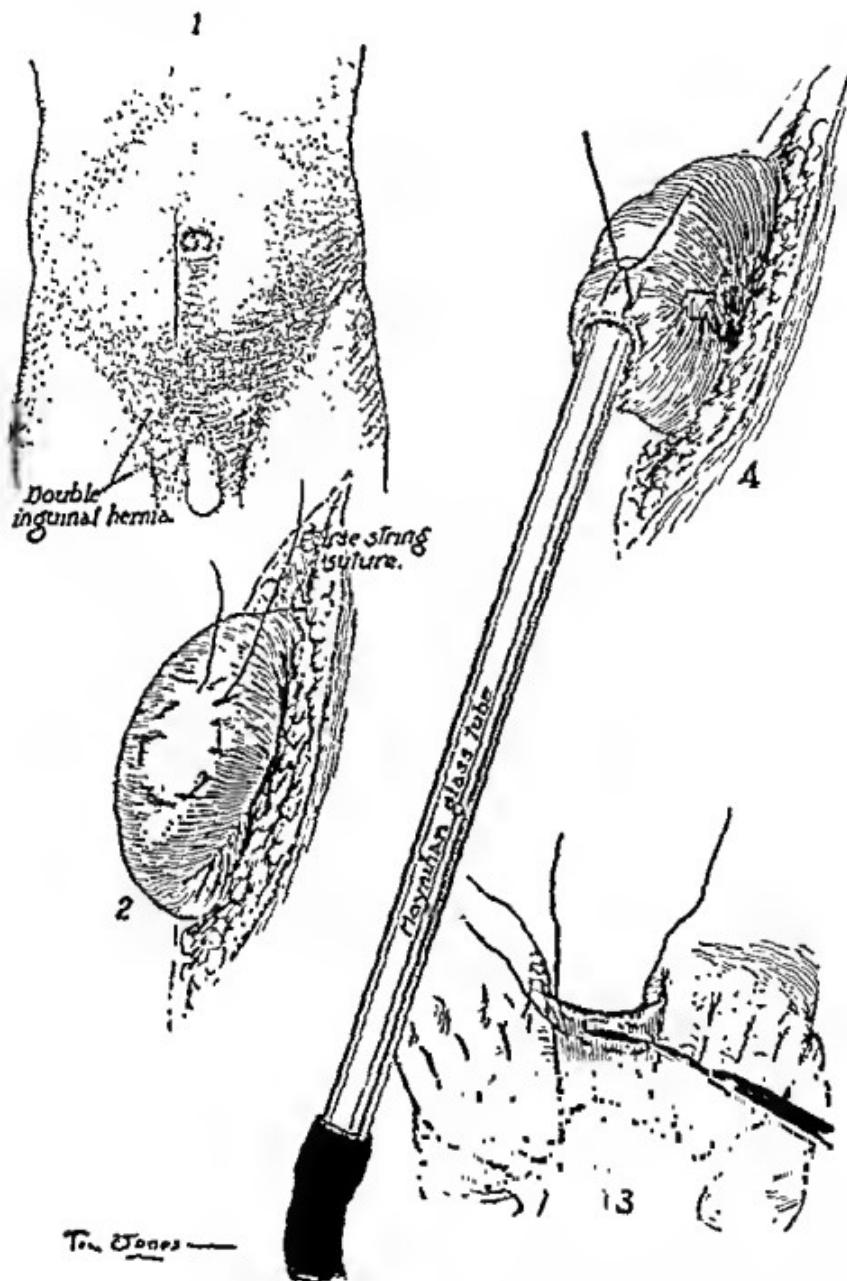
Fig. 89.—Intestinal obstruction: 1, Line of incision. 2, Proximal distended loop of bowel brought through incision. Purse-string silk suture applied. 3, Incision through the bowel. Assistant's hands prevent escape of intestinal contents. 4, Moynihan glass tube inserted and purse-string suture tied around the tube.

The small intestine is found to be enormously distended, and the necessary manipulations to determine the location of the obstruction might cause an endless amount of damage to the distended intestines   Consequently, it seems advisable to empty these of their gas and fluid contents before making any further manipulations   For this purpose we make use of the Moynihan glass tube, which is 2 cm in diameter and 50 cm in length, with one end inserted in a large rubber tube about 80 cm long   A portion of the distended intestine is grasped between the fingers and thumbs of the two hands of an assistant, grasping the intestine snugly to prevent any of the contents from passing this grasp but not tightly enough to injure the tissues of the intestine   The hands are then separated by sliding them apart, at the same time making a sufficient amount of pressure to empty completely the portion of the intestine which occupies the position between the hands   A silk suture (Fig 89 2) is then applied to the convex surface of the intestine in a form to include the glass tube after this has been inserted through a small longitudinal opening which is cut through the walls of the intestine within the grasp of these sutures (Fig 89 3)   The glass tube is then inserted through this opening (Fig 89 4) and the suture is tied so as to prevent any leakage around the sides of the tube   The tube is directed first in an upward direction, and the entire small intestine up to the transverse meso colon is threaded upon the tube (Fig 90, 5)   At the same time the stomach is emptied of any intestinal contents which may have been regurgitated into this organ by means of a stomach tube and the stomach is carefully cleansed by the use of water at 105° F , which not only cleanses the stomach but at the same time stimulates the patient   The rubber tube attached to the glass tube serves as a syphon, so that the small intestine is entirely cleansed of its contents   The tube is then withdrawn from the point of insertion and directed downward and the small intestine in this direction is threaded upon the glass tube until the point of obstruction is reached   In this manner all of the decomposing substance in the small intestine is re moved, leaving the entire intestine collapsed   The bluish tinge

of the intestinal wall is immediately replaced by a fine pink color   The stimulation due to the warm water used for gastric lavage is having its beneficial effect   As we proceed with the Moynihan tube in a downward direction we find that the point of obstruction is in the region of the internal abdominal ring on the right side   We find that when the slightly strangulated hernia was reduced two days ago the hernial sac was reduced with the hernia without dislodging the intestine from the grasp of the hernial sac, the neck of the sac constricting the intestine and preventing the latter from being freed from its grasp   For tunately the ring formed by the neck of the sac was not suffi ciently tight to produce pressure necrosis of the wall of the intestine, although it was sufficiently tight to cause a complete obstruction and to prevent a proper reduction of the hernia

In the absence of the history described above, we would undoubtedly have recognized the obstruction sooner, and had there not been several successful reductions of the herniæ under similar circumstances during the past three weeks, we would probably also have recognized the fact that the obstruction was due to a reduction *en masse* of the strangulated hernia   The fact that the hernia was so easily reducible because of the softness of the patient's tissues further served to confuse us in this direction

Having found the cause of the obstruction, we will now remove the Moynihan tube from the intestine and carefully close the wound by means of fine interrupted silk sutures (Fig 90, 6)   The small intestine is now completely collapsed   Before removing the glass tube it is sometimes best to fill the small intestine with normal salt solution at a temperature of 105° F first, for the purpose of stimulating the circulation in the small intestine, and, second for the purpose of filling the blood vessels   In case the intestinal contents which have been removed are very offensive, it is well to fill the small intestine with normal salt solution after having removed the original fluid, and then to remove the salt solution again for the purpose of cleansing the lining of the intestine

We have now replaced the collapsed small intestine in the

5

6
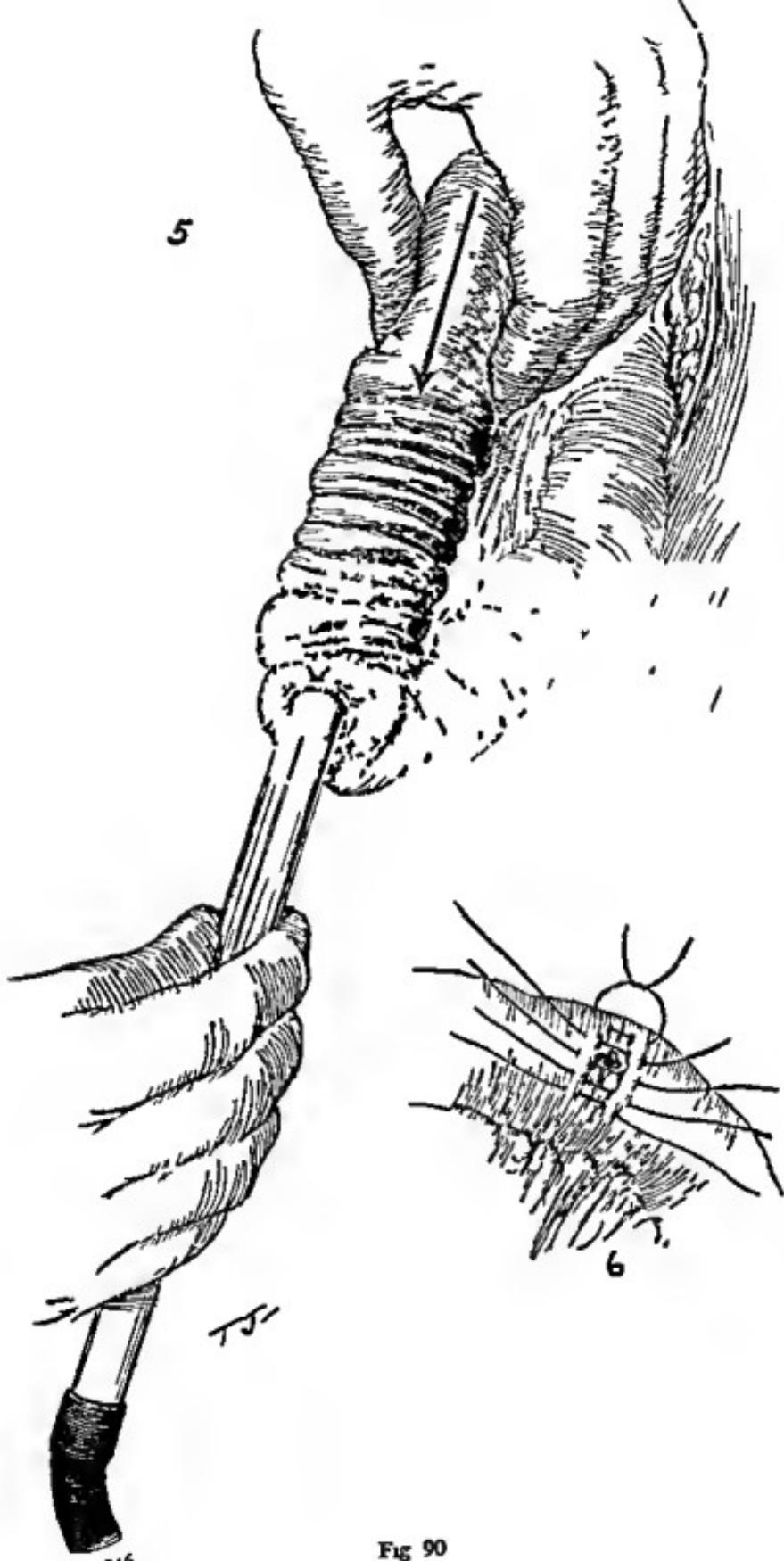
Fig 90

peritoneal cavity, and it is not difficult to make the necessary manipulations for finishing the operation, while, with the presence of the greatly distended small intestine, it would have been quite impossible to accomplish this without producing a very harmful traumatism

A portion of the ileum, 8 cm in length, is contained in the hernial sac (Fig 91, 7). By inserting a grooved director between the intestine and the neck of the sac it is possible to cut the latter without danger of injuring the intestine, and this enables us to withdraw the intestine from the sac The portion of the intestine which has been grasped in the sac is chocolate red in color, and there are some small adhesions to the lining of the sac which are evidently the result of a former strangulation, because they are not recent enough to have been formed during the present strangulation While we dispose of the hernial sac we will drop the injured intestine into the peritoneal cavity, following the plan introduced by S. C. Plummer for the purpose of determining the viability of the injured intestine.

The sac having been reduced into the peritoneal cavity, we will transfix its neck with catgut and ligate it carefully and cut away the projecting portion (Fig 91, 8) I believe that this is all that will be needed to relieve the hernia permanently, because the inguinal canal will undoubtedly close in the same manner that it would if the typical operation introduced about forty years ago by Mr. Wm. Anderson, of St. Thomas' Hospital, had been performed.

Further inspection of the piece of intestine which was contained in the hernial sac shows that the circulation has been re-established The intestine now has a pink appearance, and there can be no doubt but that it will recover fully its normal condition The abdominal wall is now closed in the usual manner, after placing the omentum over the intestines, which

Fig 90 —5, Showing method of stripping bowel over the glass tube Many feet of intestines can be emptied in this way. After clearing the intestine in one direction the tube is withdrawn just to the incision, and then the procedure repeated in the opposite direction 6, Method of closing opening by interrupted Lembert silk sutures applied longitudinally.

7

Parietal

248   Fig 91.

have now a normal color. An examination of the pelvis shows that the carcinoma in the lower end of the sigmoid flexure is inoperable, as it has invaded the surrounding tissues. The stomach-tube was left in place after the previous irrigation, and we will now fill the stomach with water at 105° F. in order to remove any trace of intestinal contents which may have remained after previous irrigation.

After-treatment.—We will immediately give the patient a subcutaneous transfusion of normal salt solution of 1000 c.c. If we had a donor at hand we would much prefer to give the patient 600 c.c. of blood, but, as it would be necessary to determine the compatibility of the blood of the donor with that of the patient, it will probably be better to make use of the normal salt solution. He will also be given normal salt solution together with some predigested liquid nourishment by rectum by means of the Murphy drip. We have found it advantageous in these cases to give 500 c.c. very slowly by this method, and then to interrupt this for two hours and then to repeat. In this manner the patient will absorb an enormous amount of fluid without running the risk of causing local irritation. In twenty-four hours broth and barley-gruel will be given in small quantities at intervals of two hours. At the end of six days he will be given buttermilk with cream and all kinds of strained soups. At the end of ten days he will be given cream soups. Milk will not be given for a period of two weeks. After the second day the patient will be given 2 ounces of liquid paraffin in 2 ounces of cream. Solid food will not be given for three weeks, and then only in small quantities, for fear of causing an irritation in the portion of intestine that was included in the hernial sac. In case the patient's pulse is above 120 beats per minute he will be given normal salt transfusions subcutaneously in quantities of 1000 c.c. once or twice daily.

Fig. 91.—7, The strangulated loop of ileum is in the hernial sac which has been

ligature, thus completing the operation.
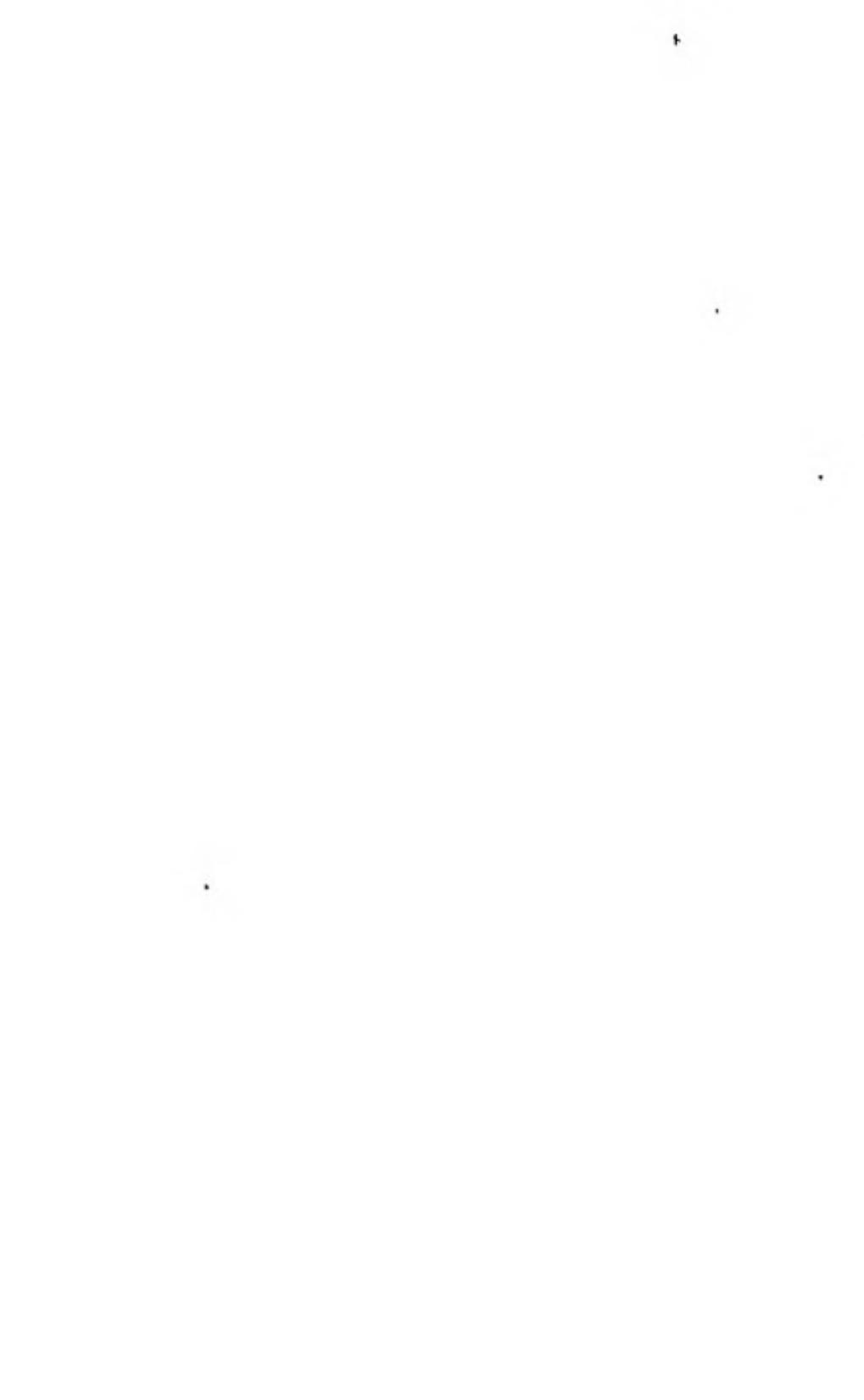
CLINIC OF DR. N. M. PERCY

Augustana Hospital

PERNICIOUS ANEMIA; SPLENECTOMY; BLOOD TRANSFUSION

Summary A patient presenting the characteristic history, physical signs, and blood picture of pernicious anemia, diagnosis, differentiation from carcinoma of the intestinal tract and anemia due to intestinal parasites, pernicious anemia probably of infectious origin—basis for this belief—a rational plan of treatment (a) massive step-ladder transfusions of whole blood, (b) splenectomy, (c) removal of all possible sources of infection, splenectomy—midline incision desirable, method of exposing spleen with least danger of injury to its pedicle—technic of removal, postoperative blood changes, technic of cholecystectomy in the present case—drainage through the right flank, blood transfusion, selection of donor of greatest importance—the Moss group method, technic of indirect closed method of blood transfusion—the apparatus, preparation of the veins, the rate of withdrawal of blood from the donor and the amount taken, immediate effect of transfusion on the recipient, ultimate results

HISTORY

This patient is a man aged sixty-two, who has a good family history, except that one sister died of cancer at the age of fifty-four He had the ordinary diseases of childhood At the age of sixteen he had an illness lasting three weeks which was diagnosed "inflammation of the bowels." During his early life he also had frequent attacks of tonsillitis Otherwise the patient has always enjoyed good health There is no history of venereal disease

Previous to the onset of his present trouble there is no history of gastric, bowel, or urinary disturbances The present illness began about two years ago when the patient began to feel weak He complained somewhat of sore mouth at that time and consulted a dentist about his teeth A few cavities in his teeth were found and repaired His sore mouth, however, remained, and a peculiar roughness of his tongue has persisted off and on ever

since The patient soon noticed that he was growing weaker and also that his pulse was gradually becoming a little more rapid Soon after this his friends noticed that he was not look ing well saying that his color was unnatural At that time he consulted a physician and was told he had heart trouble The patient gradually became weaker although at times for two or three months he would feel much better and think he was going to be well This weakness gradually grew worse until about four months ago he was unable to be about at which time he was taken to a sanitarium for treatment. A diagnosis of per nicious anemia was made and the patient was placed upon treatment which included medicine administered hypodermically The general condition of the patient remained about the same at times he was able to sit up in a chair but was confined to bed most of the time.

About one month ago he developed pain and tenderness in the right upper quadrant of the abdomen which was accom panied by a rise in temperature and vomiting The patient's general condition gradually grew worse until his admission to Augustana Hospital on November 18 1916 at which time he was bedridden and was able to take hardly any nourishment because of vomiting He had a temperature of 100° F a pulse of 120 and respirations 30 He was very weak and apathetic and there was a peculiar lemon yellow tinge to the skin The mucous membranes were very pale He had a sore mouth and red tongue and some edema of both legs The teeth were nega tive The urinalysis was negative Hemic murmurs were present otherwise the chest examination was negative There was marked tenderness and some rigidity present in the right upper quadrant of the abdomen otherwise the abdomen was negative The reflexes were normal and no sensory disturbances were present.

A blood examination at this time showed a count of 1 420 000 red corpuscles a hemoglobin of 28 per cent giving a color index

         81 minutes

         mega

loblasts and numerous Howell bodies   count

revealed polymorphonuclears 53 per cent, small lymphocytes 28 per cent, large lymphocytes 15 per cent, transitionals 1 per cent, eosinophils 1 per cent, basophils 1 per cent, myelocytes 1 per cent. The blood platelets were rare. There was also present a very marked anisocytosis and poikilocytosis. Polychromatophilia was not present.

On account of the patient's weakened condition and his inability to retain any food in the stomach a transfusion of 650 c c of human blood was given the day after admission and the gastro intestinal examination delayed one week, when the patient was in much better condition. The stools were then carefully examined for intestinal parasites, but none were found. Stools were also negative as to blood.

Stomach Examination—After the test meal 150 c c of brownish white fluid was aspirated from the stomach. No blood or bile was found, but a considerable amount of mucus was present. No food remnants in stomach at end of six hours. Total acidity 4 free hydrochloric acid 0, combined hydrochloric acid 4. No lactic or fatty acids present. Microscopic examination revealed some cocci and bacilli, but no Boas Oppler bacilli. No red blood cells or leukocytes found. Fluoroscopic examination and x ray plates of stomach were negative.

COMMENTS BY DR N M PERCY, December 26, 1916

Diagnosis—You will note from the history that the clinical picture is quite typical of pernicious anemia with a recent attack of cholecystitis. The important points in this history are Anemia and weakness coming on gradually without apparent cause, and gradually progressing, but with periods of remissions, persistence of sore mouth and tongue, loss of appetite, and finally inability to retain food in the stomach, but no special gastric distress. Sore mouth is quite a common symptom, being present in about 50 per cent of cases. The conditions most apt to be mistaken for pernicious anemia are carcinoma of the intestinal tract and anemia due to intestinal parasites especially the Entamoeba histolytica. The latter has been eliminated in this case by the negative results of a careful search

of the stools for parasites The stomach findings here are quite typical of pernicious anemia The total acidity is low and there is no free hydrochloric acid present While the appetite is very poor, there is no pain, no obstruction, no blood or other find ings pointing toward a carcinoma The blood picture is quite typical of pernicious anemia except for the leukocytosis of 20,500, in the majority of cases of pernicious anemia there is a mild leukopenia the average count being about 4000, frequently as low as 3000, and occasionally as low as 1200 to 1500 The recent acute infection in the gall bladder, which developed about four weeks ago, undoubtedly accounts for the leukocytosis As soon as the inflammatory symptoms in the region of the gall bladder subsided the white count dropped to 4000 The color index was 1 We have found the high color index to be the most constant blood finding in pernicious anemia In addition to a color index of 1 he had an increased coagulation time, the blast cells were abundant, there was a very marked poikilocytosis and anisocytosis and a mild lymphocytosis This blood picture, together with the other clinical findings especially with a history of periods of remissions, is sufficient to make a diagnosis of per nicious anemia

Etiology —As to the etiology of pernicious anemia, there is very little known, in fact the whole subject of anemia is rather obscure There still seems to be some difficulty in even estab lishing a rational plan of classification of anemias in general This is probably due to our meager knowledge of the hemato poietic organs Pernicious anemia is an artificial, arbitrary term meaning simply the final degree of viciousness in anemia Whatever the cause of pernicious anemia may be, it seems quite clear that it must be classed as a hemolytic anemia, that is one in which there is an increased destruction of blood rather than a lack of production of blood The fact that removal of the spleen brings about a marked reduction in blood destruction indicates that the increased blood destruction is in some way associated with an abnormal functioning of the spleen Various observers, in studying blood destruction in pernicious anemia before and after splenectomy have found that greatly increased

hemolysis present before operation showed a constant and marked decrease afterward yet the manner in which the increased hemolysis takes place is an unsettled question While the factor maintaining the normal balance between the production and destruction of blood is unknown, most observers agree that the spleen is the organ primarily responsible for the destruction of the worn out blood cells

The spleen is the largest of the ductless glands, but there is very little definitely known concerning its function It is evident, however that the spleen does not have an important internal secretion because of the fact that its removal does not deprive the body of any important constituent and does not jeopardize the life or comfort of the individual subsequently There are numerous reports where on account of injuries to the spleen it was deemed necessary to remove it, and after the lapse of many years the patient had apparently suffered no ill effects therefrom Notwithstanding the fact that there has been an immense amount of research work done regarding the physiology and function of the spleen a great deal of confusion still exists There has really been very little determined that might guide us in the treatment of diseases apparently due to an abnormal functioning of the spleen We still must depend upon clinical observations to guide us in determining the course of treatment in these cases

While the etiology of pernicious anemia is unknown it seems evident that there is a condition of increased hemolysis together with some action on the bone marrow From our study of these cases we have been impressed with the observations of Hunter as to the toxic or even infectious nature of the disease The question is, What is the source and nature of the infection? Early in our work, when studying 2 cases of pernicious anemia, we noted that the symptoms of a chronic cholecystitis were a prominent feature in the history and had existed for a considerable time previous to the onset of the anemic symptoms The existence of an infected gall bladder was demonstrated later at the time of operation Since this time every case has been studied for the existence of a chronic infection, and in practically

every case one or more foci of infection were found   Just what
effect the presence of a low grade infection may have upon
the hemolytic organs is still unknown   The regions in which
foci were found were the gall bladder appendix teeth and
throat   In 38 cases of pernicious anemia which have come to
operation during the past three years cholecystitis with or with
out stones was found in 30 cases 26 of which also showed evi
dence of infection in the appendix, 6 cases showed marked evi
dence of infection in the appendix, 7 cases had marked infection
about the teeth and 2 cases had infected tonsils   The spleens
removed have shown evidence of a chronic splenitis and usually
perisplenitis   indicating that a toxic or infective process had
been present there

Early in our work the diagnosis of these infections was
made from the macroscopic pathologic findings at time of opera
tion   From the last 9 cases of pernicious anemia operated all
the specimens removed were sent to the laboratory for bacterio
logic study with the following results   Bacteria were grown
from three of the nine spleens removed from four of the seven
gall bladders removed and from six of the seven appendices
removed   The only case not giving a growth was the one in
which the spleen was the only organ removed the appendix
having been previously removed   This patient had a long
standing pyorrhea for relief of which several teeth were ex
tracted   The predominating micro-organism found was the
hemolytic streptococcus being present in 7 of the 9 cases   The
colon bacillus was present in 5 the Streptococcus viridens in 4
the Staphylococcus albus in 1   While it is impossible to state
anything definite as to the relation of these various infections and
pernicious anemia still it is an interesting observation both from
the standpoint of etiology and treatment

Now as to treatment

Believing that pernicious anemia is in all probability a dis
ease of infectious origin and that the spleen has an abnormal
hemolytic action on the blood elements with a late bone-marrow
exhaustion it would seem that the rational treatment should
consist of three main factors—viz   (a) Massive step ladder

transfusions of whole blood, (b) splenectomy, and (c) removal of all possible sources of infection

Each of these steps is important The blood transfusions nourish and stimulate the bone-marrow to action and help to restore the secondary changes in the various organs, the splenectomy reduces the amount of blood destruction and the removal of the foci of infection relieves the patient of a source of chronic toxemia and possibly an etiologic factor of the disease

I have here the blood chart of this case showing the changes in the blood condition since his admission to the hospital five weeks ago He was given a transfusion of 650 c c of blood on November 21st, and by November 24th his red blood count has increased from 1 420 000 to 2,900 000, the white count having decreased from 20 500 to 14 000 By the 27th the red count decreased to 2,500 000 and the white count to 4000 During this week the patient was given only small amounts of liquid food and hot moist dressings were applied over the gall bladder region The pain tenderness, and rigidity in right upper quadrant of abdomen had practically all disappeared by the end of his first week in hospital A second transfusion of 600 c c of blood was given on November 28th The diet was increased and 10 drops of tincture of nux vomica was given before meals and 20 drops of dilute hydrochloric acid after meals On December 5th his red count was 3,040 000 white count 4100, and his general condition was very much improved A third transfusion was given on December 7th and a fourth on December 23d Yesterday, December 25th his red count was 4 010 000, hemoglobin 73 per cent , white count 6400, polymorphonuclears 69 per cent , small lymphocytes 20 per cent large lymphocytes 7 per cent , transitionals 2 per cent , myelocytes 2 per cent The entire blood-picture has changed, very few nucleated cells are present and the red cells are much more regular in outline and more uniform in size During these past four weeks the patient has taken three good meals daily, which, together with the four blood transfusions have changed the entire clinical picture This patient is now a good surgical risk while at the time of admission to the hospital he was a very bad surgical risk

The operative procedure in this case will consist in removing the spleen gall bladder and probably the appendix This will be followed by a transfusion of 600 to 800 c c of whole blood

Operation (December 26 1916) —In doing a splenectomy in a case of pernicious anemia we elect a high midline incision in stead of the ordinary left rectus incision We elect this incision for three reasons First so that we can explore the rest of the abdominal cavity namely the region of the gall bladder stom ach and appendix Second this incision can extend higher than any other incision namely to the ensiform cartilage Third it is easier to reach the spleen through a midline incision when the pedicle is short because the blood supply of the spleen runs from right to left and as we dislocate the spleen and roll it upward we are pulling it toward its blood supply and we run less danger of tearing its pedicle in bringing it up

Now we will make our incision from the ensiform cartilage to the umbilicus in the midline I am making the incision in the linea alba to have as little hemorrhage as possible and we now split the linea alba Now we come down and pick up and open the peritoneum We will place forceps on all the subcutaneous bleeding points so as not to lose any more blood than is neces sary

Now that the abdomen is open we will make an explora tion of the abdominal cavity First coming down in the region of the gall bladder we find the omentum adherent to the gall bladder and as we get down further we find rather a tense gall bladder which is not compressible Its walls feel very thick and edematous As we explore further we find numerous en larged lymphatic glands along the cystic and common ducts but apparently no stone We will now explore the appendix region The appendix is found adherent back of the cecum and kinked the distal end is cicatricial and there is a strong adhesion about 1 cm from the cecal end making a distinct kink in the appendix We will now loosen the appendix and remove it You see how easy it is to bring the appendix up into this midline incision which extends no further than the umbilicus Now we will explore the spleen We have just explored the pelvis and the

colon, both of which are negative. On exploring the splenic area we find the omentum adherent to the lower end of the

Fig. 92.—Through a midline incision, well retracted to the left, the spleen is brought forward with the hand. Note the proximity of the stomach and pancreas. Omentum and intestines packed away with gauze.

spleen and to the anterior abdominal wall. The upper portion of the spleen is not abnormally adherent.

We will now place one large abdominal pad in the left upper quadrant of the abdomen to keep the omentum, colon, and small

intestine away from the field of operation   Now the omentum
is carefully loosened from where it is adherent to the spleen   I
now pass my hand around the outer and upper edge of the spleen

Fig 93—Removing the spleen   Two rubber covered clamps applied to the
pedicle   Insert A shows method of ligating with two ligatures after the proximal
clamp has been removed

and loosen it from its location against the diaphragm and from
in front of the left kidney (Fig 92)   Now as the spleen is loosened
you see it is rolled forward to the midline   In doing this it is

rolled toward the base of its pedicle and not away from it. By passing the thumb and finger around the pedicle of the spleen we depress the stomach, and then we grasp the pedicle with two rubber-covered clamps, being careful to protect the tail of the pancreas and also the stomach, as these spleens are usually in very close apposition to the stomach at their upper borders (Fig. 93). In this case we can grasp the entire pedicle with one forceps, though frequently it is necessary to grasp the splenic omentum above and below the pedicle separately. It is always easy to tie the gastrosplenic omentum at its lower pole, but it is often difficult above because of the vasa brevia which are present in the gastrocolic omentum at the upper portion, as they run from the splenic artery to the stomach. Now that we have grasped the pedicle of the spleen in these two forceps, and have been careful not to injure the stomach in so doing, we will cut off the spleen pedicle and let the contained blood go into the abdomen, as there is no space to place another forceps on the pedicle. With the extremely short pedicle of this spleen you see how much easier it is for me to pull the spleen up through this midline incision than through a left rectus incision. We will now ligate the pedicle of the spleen *en masse* by first transfixing with heavy catgut and tying, using two ligatures.

You will notice that the assistant is making a blood count while I am tying the pedicle of the spleen. An immediate leukocytosis takes place following splenectomy. We have recently made the observation that this leukocytosis is primarily a lymphocytic leukocytosis, while formerly we always supposed it was a polymorphonuclear leukocytosis. This lymphocytic leukocytosis, however, gives way to a polymorphonuclear leukocytosis within twenty-four hours. This patient's white count, which at the beginning of the operation was 4400, is undoubtedly by this time 12,000, and by this evening or tomorrow will be 20,000 or 25,000.

You see we have now ligated the pedicle of the spleen *en masse*. You notice we have not lost a single drop of blood from the pedicle of the spleen. We will now make a suture in the pedicle of the spleen to make sure that our ligature will not slip

(Fig 94) Now, by putting a couple of little sutures in when the pedicle is ligated it makes it impossible for the pedicle liga-

Fig 94 —Stump of ligated pedicle Two or three sutures passed through the stump to insure against slipping of the ligatures These sutures are tied and the colon and intestines allowed to replace the splenic space The abdominal wound is then closed without drainage

ture to slip Now we will see if any of the adhesions at the lower part of the spleen and in the region of the pancreas are bleeding, and if so, the areas will be sutured Right in front of the spleen

you will see one little vein oozing   We will suture this with fine
catgut   There is the tail of the pancreas   We will now sponge
out the space from which the spleen was removed which, of
course, contains the blood which was in the spleen at the time
its pedicle was cut   In sponging out the splenic area you will
notice that it is absolutely dry   That is the blood that was in
the spleen   There was not 1 dram of blood lost from the splenec-
tomy   Now we allow the pedicle of the spleen and the splenic
flexure of the colon to drop back into its normal position

Cholecystectomy —Coming over into the region of the gall-
bladder again, we find an edematous and distended gall bladder
with the omentum still adherent to it   You will note that from
our midline incision it is also very easy to get at the region of the
gall bladder   We will now clamp the omentum, which is strongly
adherent to the fundus of the gall bladder, between two pairs of
forceps and ligate it   We separate the adhesions down to the
site of the gall bladder   We again examine the common duct
and find no stone   There is an enormously enlarged lymphatic
gland   We find rather a strong adhesion between the pylorus
and the neck of the gall bladder   We will remove this infected
gall bladder by first dissecting free its cystic duct   We have now
separated the cystic duct and it is clamped by two pairs of forceps
and cut   Holding the cystic duct and neck of the gall bladder
forward, the cystic artery is secured and then the gall bladder is
removed   All the specimens removed are placed in a sterile
basin and cultures will be made   Contrary to our usual custom,
we will leave the cystic duct open instead of ligating it because
of the acute inflammatory trouble in the gall bladder   We
place a ligature on the cystic artery and then place two or three
sutures on the under surface of the liver   bringing together the
two peritoneal edges of the space from which the gall bladder has
been removed   We place one more suture here in the liver at the
former site of the gall bladder   We are going to place our
drainage from the gall bladder in a stab wound over in the
right ileocostal space so as to keep our drainage away from the
pylorus and the duodenum   That will do away with the possi-
bility of getting adhesions between the liver and duodenum,

the stomach, and the anterior abdominal wall I simply cut
through the skin and then pass the forceps through and stretch
the muscle   Then the drain is drawn down underneath the
liver   Our drain is placed transversely from the cystic duct
right across underneath the edge of the liver through the stab
wound and then the hepatic flexure of the colon is laid back up
against the drain in its normal location

In looking over the space from which we removed the spleen
I find that area perfectly dry We will now close the abdominal
incision in the usual manner You will notice that the patient
looks well but his pulse is rapid being 120 per minute

Now we will give him a blood transfusion which will un
doubtedly bring the pulse down under 90 before he leaves the
operating room

BLOOD TRANSFUSION

The most important part of a blood transfusion is the selec
tion of a proper donor The donor should not only be a person
whose blood is compatible with that of the patient but he should
be free from any infectious disease It is not justifiable to make
a blood transfusion without first determining the compatibility
of the two bloods by hemolytic or agglutination tests This
applies to near relatives as well as to aliens

During the past thirteen months we have been using the
group method of Moss in selecting donors This method is
based on the theory that before hemolysis takes place between
two bloods there is always previously or simultaneously an
agglutination of the corpuscles of one blood by the serum of the
other The reverse however, is not necessarily true occurring
in only about 20 per cent of cases Moss has found that all
individuals can be classed into four groups according to the ag
glutinative properties of their blood In selecting a donor we
like to have the patient and donor belong to the same group
The technic of grouping the blood after the Moss method is very
thoroughly described by Brem in the Journal of the American
Medical Association July 15 1916

This patient belongs to group II His wife and two daughters
also belong to group II We will use the wife as the donor today

The method of transfusion which we will use is an indirect closed method. We call it a closed method because the blood does not come in contact with the air. The apparatus consists of a large glass tube of 900 c c capacity, one end of which is drawn out into a canula to be inserted directly into the vein, the other end drawn out to a tube about 1 cm in diameter with which a Y connection is made. The Y connection has a two way valve (Fig 95). To one arm of the Y a rubber tube and glass mouth piece are attached so that suction can be made during the filling of the tube. To the other arm a rubber atomizer bulb is attached to aid in emptying the tube. The tube is coated inside with solid grocer's paraffin, and just before the transfusion is begun about 1 ounce of sterile liquid paraffin is aspirated into the tube. The liquid paraffin will remain at the top of the column of blood and thus prevent the blood from coming in contact with the air.

An ordinary blood pressure cuff will now be placed around the arm of the donor as high as possible. If one wishes to draw off blood rapidly from an arm there must be just enough constriction of the arm to obstruct the venous circulation, but not enough to interfere at all with the arterial circulation. The amount of pressure can be regulated accurately by the use of the blood pressure apparatus. The cuff is now inflated until the gage registers 50 and it is kept at this pressure, as we have found this to be the proper pressure for the average individual. You can see how plain the cephalic vein shows now. We will anesthetize the skin by injecting 0 5 per cent novocain solution. I have now exposed the cephalic vein for a distance of ½ inch. A ligature is placed around the proximal portion of the vein and a small clamp on the distal portion. A small slit will now be made in the wall of the vein and a special forceps placed on each side of the opening in the vein to keep it open making it easy to introduce the canula of the tube into the vein. A vein on the front of the forearm of the patient is now exposed and prepared in the same manner except that it is ligated distally and the little clamp placed proximal to the opening in the vein. We always make an open dissection of the veins so as to avoid hav

DONOR

Ligature

Mosquito clamp

Carrel clamp.

1a

RECIPIENT

2a

2

1

2

Tim Jones—

266

Fig 95
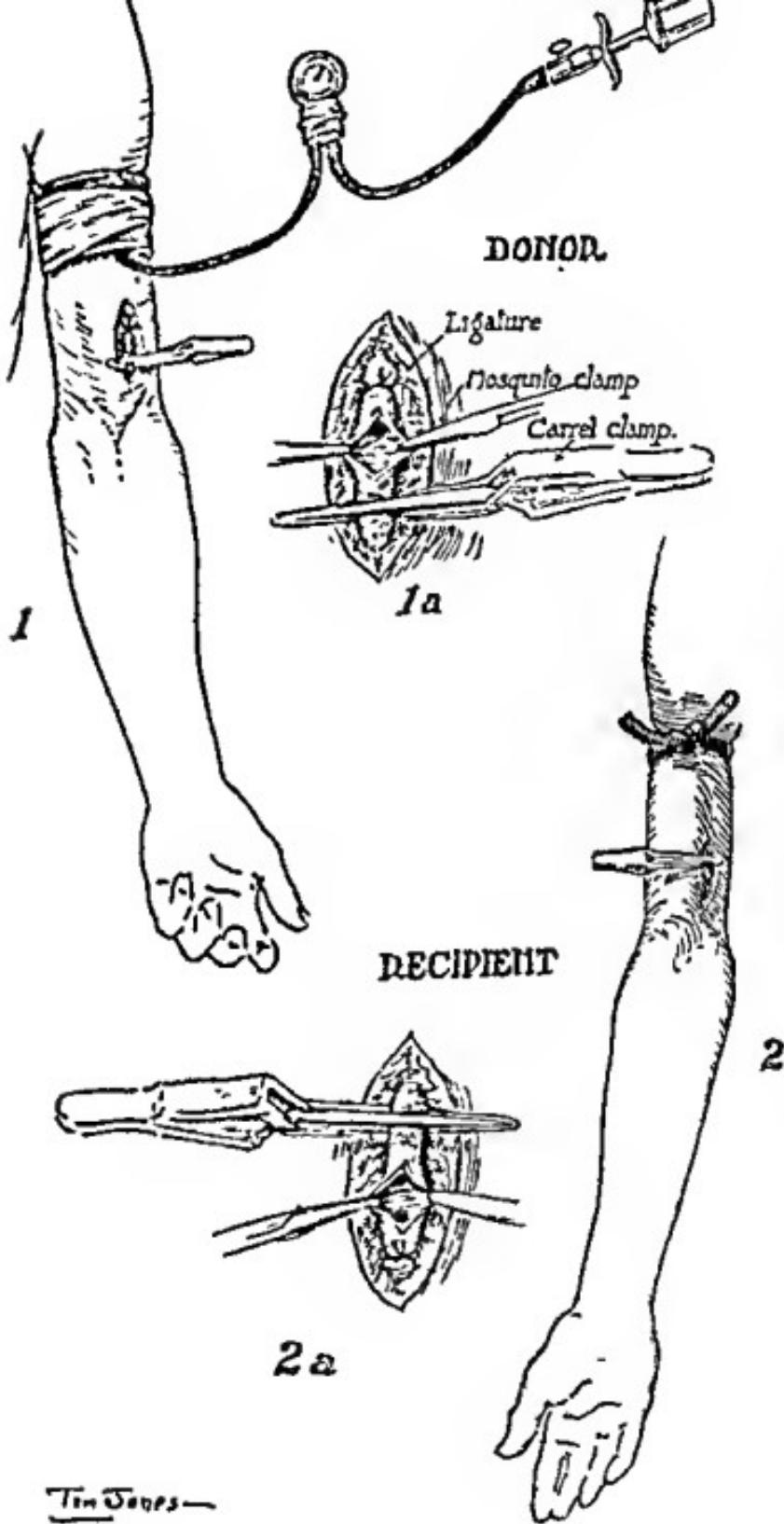
ing to make any connections to a needle, which would make a rough area, thus favoring the formation of a clot. Furthermore, in chronic anemic cases the superficial veins are so small that it is necessary in 80 per cent. of instances to make an open dissection of the vein.

The veins of both donor and recipient have been prepared. We now insert the canula of this tube distally into the donor's vein and remove the little clamp from the vein. The assistant now makes gentle suction on one arm of the Y connection of the tube, thus aiding in filling the tube (Fig. 96, 3). You can see the layer of liquid paraffin remaining on top of the column of blood, keeping the blood from the air. You will notice that the tube is filling at the rate of 200 c.c. per minute, which is our average flow from a male donor. It has taken just three minutes to obtain the 650 c.c. of blood. The assistant now closes the Y valve, thus creating a vacuum in the tube, which will prevent the blood from escaping from the tube while it is being transferred to the recipient's vein.

We now insert the canula of the tube into the vein of the recipient (Fig. 96, 4). The blood is now flowing into the recipient; the rapidity of flow is controlled by the amount of pressure made by compressing the atomizer bulb. It has taken a little over two minutes to empty the tube.

The veins of both donor and recipient are ligated and the wound closed with horsehair. You will note that it was not more than ten seconds from the time the canula was removed from the donor's vein until it had been inserted into the recipient's vein. The patient received 650 c.c. of whole blood which did not come in contact with the air; in fact, the blood did not touch anything except the smooth paraffin, not even glass.

Comments.—The immediate effects from a blood transfusion are usually quite striking, especially as to relieving the symptoms of shock. A few minutes ago this patient's pulse was 120 per minute, and now, within ten minutes after receiving 650 c.c. of

Fig. 95.—1, 2, Preparation of the arms of donor and recipient for blood transfusion. 1a, 2a, Dissection of the veins of donor and recipient shown in detail.

megaloblast was seen, but no normoblasts No polychromato
phiha present The red cells were quite uniform in size, but a few
were slightly irregular in outline Polymorphonuclears, 64 per
cent , small lymphocytes 28 per cent large lymphocytes, 7 per
cent , transitionals, 1 per cent

CLINIC OF DR. JOHN RIDLON

Presbyterian Hospital

CONGENITAL DISLOCATION OF THE HIP

Summary Time to replace the hip is determined not by the age of the child, primarily, but by the degree of shortening and the muscular development—causes of restricted motion following operation, technic of the 'Lorenz operation"—its limitations, the Ridlon operation—the permanent dressing and after treatment, hip cases divided into three classes when considering prognosis—results least satisfactory in bilateral cases, how to manage recurrence in bilateral cases, failure of cutting operation—functional results when anterior transposition is the best obtainable anatomic result—treatment after removal of cast

October 30, 1916.

WE have today three patients with congenital dislocations of the hip   They illustrate several phases of the condition   The first is a girl four years old with 1½ inches upward dislocation of the right hip   She began to walk when she was sixteen months old and has had no treatment.   Most cases of congenital dislocation of the hip are in girls   I do not know why   In most cases of unilateral dislocation it is the left hip that is affected   Why I do not know.   In this case it is the right   The amount of shortening when the child has walked only a short time is about ¾ inch. By the end of the second year the shortening reaches about 1 inch   By three and one-half years, the choice age for operating, the shortening has become from 1½ to 1½ inches   Much has been said about the proper age for operating and the age limits   Really the age has very little to do with the right time to operate.   It is the extent of the shortening that is of real importance   To replace a hip when the shortening is only ¾ to 1 inch is usually as unwise as it is easy to do.   Such a case when replaced almost invariably slips out again because the structural shortening of the muscles is not enough to hold the replaced hip securely in its

socket. On the other hand one must not wait for too great shortening 1¾ inches shortening in a well muscled child eight or nine years old is difficult to replace although 2 inches may not be difficult in a child of three or four years of age   At any age where the shortening amounts to about 2 inches if the replacement is difficult the hip is often left with more or less restricted motion for a year or two   The restriction to motion after replacement in very difficult cases appears to be due to two causes   First the lack of required length in all the muscles controlling motion at the hip-joint   second to the severe intra articular pressure caused by the short muscles   Here are two radiograms illustrating such a result (Figs 97 and 98)   When this girl was seven years old Lorenz attempted to replace the dislocated hip—and failed   I immediately replaced the hip   This radiogram was taken on the removal of the cast eight months after the operation (Fig 97)   It shows the femoral head in the socket and the usual form and angle of the neck in its relation to the shaft   A radiogram made twelve years later (Fig 98) shows the head depressed to the position of coxa vara   The young woman had a normal range of motion walked without limping and believed the result of the operation to be perfect   She did not know that the limb was an inch short   Most cases where the muscular shortening is great have a flattening of the head of the femur and some pressure changes in the upper part of the acetabulum that with the shortened muscles cuts off about half of the normal range of motion

The bloodless replacement of these congenitally dislocated hips is usually called the "Lorenz operation   The operation which I shall show you is not the Lorenz operation   Lorenz thought he stretched the capsule of the joint by extreme movements of the limb in all directions and then stretched the limb itself downward by having two or three men pull on it while the pelvis was held fast by a sheet passed between the legs and tied to the head of the table   After stretching to his satisfaction he flexed the thigh to a right angle and from that position abducted it until the adductor muscles stood out prominently   These he tore across subcutaneously by hacking at them with the edge of

Figs 97 98—Illustrating changes sometimes produced in congenitally dislocated hips after reduction by the severe intra articular pressure due to unusually short muscles
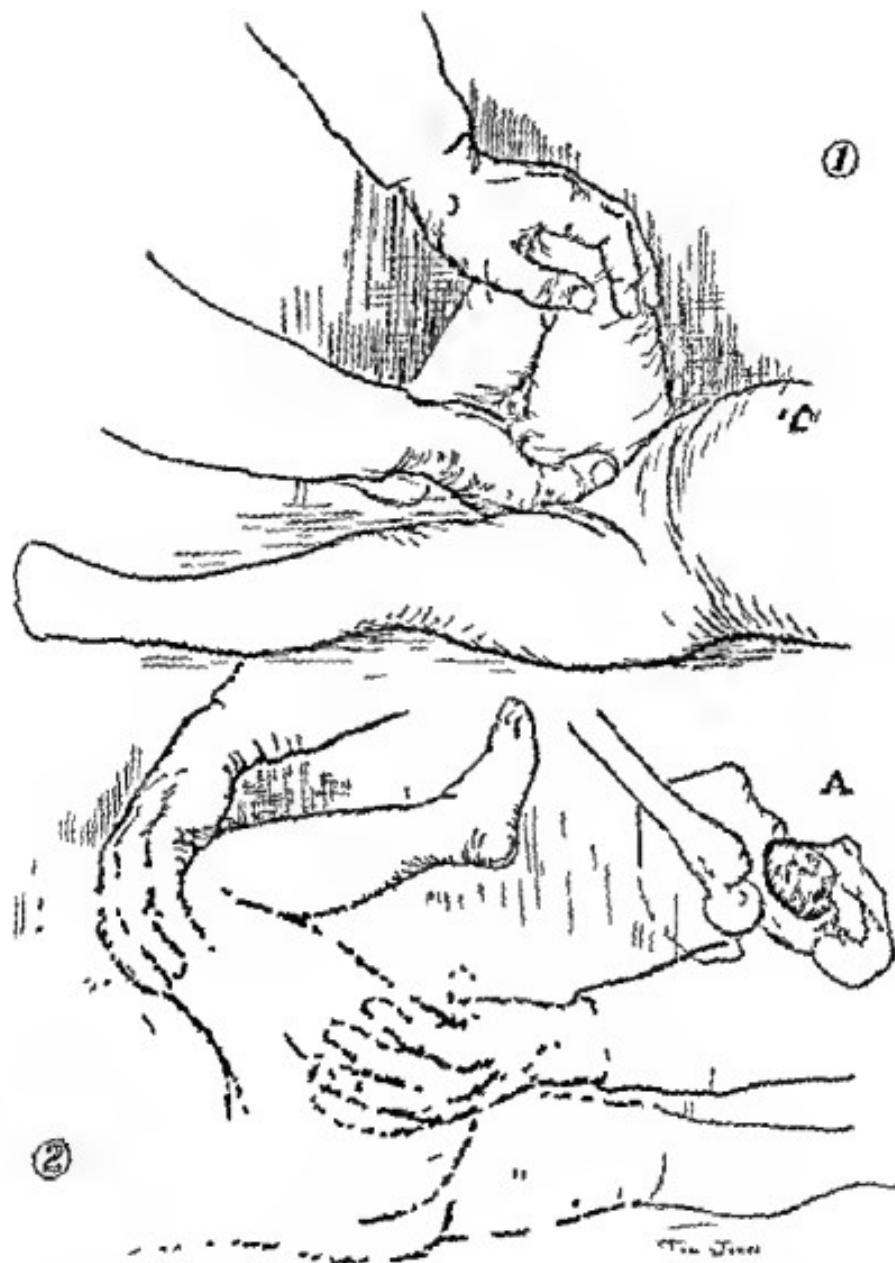
Fig 99—1, The thigh flexed to right _ _ It hand when the operation is on the right leg The thumb of the right hand shows in front of the socket 2, Posterior (and somewhat inferior) view showing the thigh fully flexed by the left hand on the patient's knee and the first three fingers of the right hand on the head, neck, and greater trochanter of the dislocated hip Insert *A* shows the bone relations at this point The head is passing down from above the socket
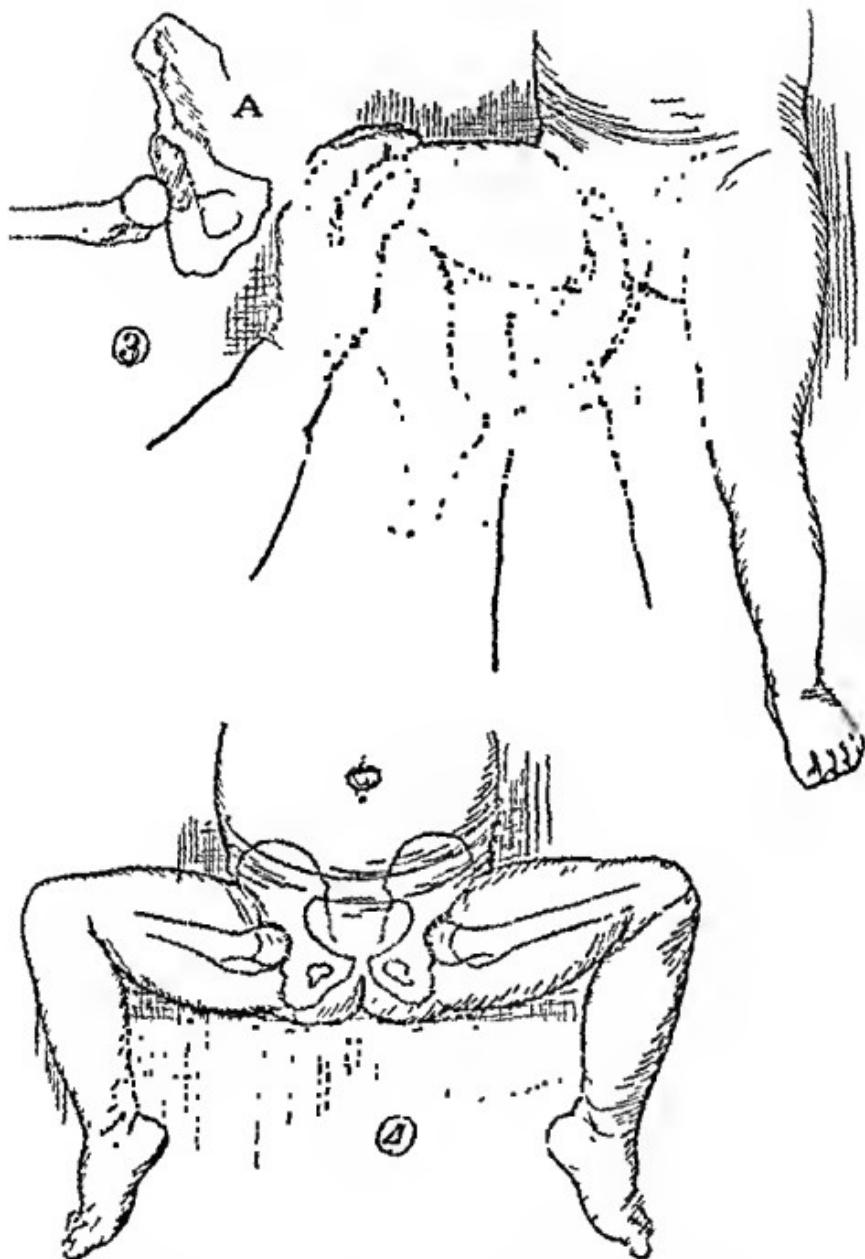
Fig 100—3, The position of abduction as the head passes into the socket. The head can be felt now rising up in front by the thumb of the right hand. Insert A shows bony relations. The head rising up into the socket. 4, The frog position in a bilateral case after both hips have been replaced. Relations of femur and hip shown diagrammatically.

his hand   Then he further abducted the thigh from the position
of right angled flexion, prying it over the edge of Konig's wedge-
block under the buttock until the femoral head passed over the
back of the rim of the socket into it, or until the femur broke
(usually at the neck) or he gave up, calling it an impossible case
During the two years following Lorenz s visit here I broke five
femoral necks while attempting his operation   Then I changed
my method to the one which I shall show you, the one which is
known among orthopedic surgeons as the Ridlon operation
This is the operation I have been doing since 1904   It is much the
same operation as was described in the December, 1915 number
of the Murphy Clinics

Without any preliminary stretching or treatment of any
kind whatever the patient's flexed right knee (if this is the dis
located hip) is grasped in the operator s left hand and the thigh
fully flexed on the body   Then the operator finds the greater
trochanter, neck, and head of the femur with the fingers of his
right hand and places the thumb of that hand in front below
the anterosuperior spine of the ileum in front of the socket
(Fig 99, 1, 2)   For the left hip the position is reversed   Thus
can one judge accurately the relation of the femoral head to the
socket   When the thigh is fully flexed, the femoral head is usu
ally opposite the lower part of the socket   Sometimes it is too
low and the flexion of the thigh must be lessened   At other
times it is not low enough   but can be brought low enough by ro
tating the thigh inward   This turns the foot and the leg out
ward   When the head is finally in the right position opposite
the lower part of the rim of the socket the operator abducts the
thigh with the left hand which is grasping the flexed knee, the
opposite side of the pelvis being meanwhile held firmly down by
an assistant, and the head can be felt by the operator s fingers and
thumbs passing forward and into the socket (Fig 100 3 4)   In
cases that have a fairly good socket the operator can let go of the
limb after it has been replaced and the hip will stay in place
In cases with poor sockets the hip will slip out as soon as he lets
go of the limb   In such a case the hip should be replaced again
and again, and further stretched and twisted about to determine

whether it is more secure in right-angled abduction with 90 degrees of outward rotation (the usual position chosen, Fig. 101), or in right-angled abduction without any rotation, and the most secure position having been determined, it is put up permanently in that position.

When the limb is put up in the first position with the outer side of the thigh looking backward, if the head slips out, it will go forward into "anterior transposition," which for some cases is a good result. If the head slips out from the second position (back of thigh looking backward), it goes backward or upward and the result is not good, and the hip should be replaced at some later date.

To put on the permanent dressing the patient is clothed in a skin-fitting stockinette garment covering the body to the nipples and the leg (or legs) to the ankle. Then the *patient is raised a few inches* above the table and placed on a sacral and back rest, and the security of the hip in place is again tested. Then the patient is covered to the thickness of $\frac{1}{4}$ to $\frac{1}{2}$ inch with sheet wadding bandages. These are bound

Fig. 101.—Diagram suggesting the course of the femoral head as it passes from its dislocated position above socket, backward and downward to the lower part of the socket where it enters.

firmly and smoothly down by the ordinary roller bandage. Then the plaster bandages are put on to make the plaster cast. The plaster splint ought to be at least $\frac{1}{4}$ inch thick on the thigh and at least $\frac{1}{2}$ inch thick on the body. If the position chosen is with the outer side of the thigh looking backward, the plaster cast need extend only to the knee, but if the back of the thigh looks backward, the cast must be extended down on the leg with the knee bent at right angles to

prevent the thigh from rotating into the other position which is the one it naturally takes. At the top the cast is trimmed down to the free border of the ribs and it is trimmed out back and front to free the genitals and anus. Then the stockinette is turned over the outer side of the cast and drawn snug and sewed fast. Finally, before the child is removed to her bed we pass a thin towel between the body and the back of the cast, place a 2 inch pad of absorbent cotton held in gauze at the back of the body part of the cast and fold the towel ends over it and pin them fast. This towel and pad serve two purposes. First, they raise the child up from the bed so that she lies in the cast and not so that the cast lies on her, second it catches any drip of urine. When she has been removed to her bed it may be necessary to place a small pillow under the thigh portion of the cast to relieve the inner condyle at the knee joint from pressure of the cast.

The next case is a boy three and one half years old with both hips dislocated upward and somewhat forward. The shortening as shown in the radiogram and as measured in relation to Nélaton's line is about 1½ inches. He stands with his lumbar spine curved forward—lordosis—the hips prominent and the thighs somewhat flexed on the pelvis and the legs somewhat flexed on the thigh. This deformity and shortening will gradually increase if he is left without treatment and by the time he is fifteen years old may amount to as much as 5 inches. The radiogram shows very shallow sockets (Fig 102), but the result of operating cannot be safely prognosticated from this alone. In some cases the radiogram may show the socket apparently good but when the hip is replaced it will be found very insecure. In other cases the socket may appear very shallow, but when the hip is replaced will be found to receive the femoral head and hold it securely in place.

I am accustomed arbitrarily to divide these hip cases into three classes for the sake of prognosis.

First. Those that are displaced backward and upward. The femoral head can be felt under the buttock muscles and cannot be felt in front on extreme outward rotation.

Second. Those displaced directly upward. The femoral

head can be felt in front on outward rotation and at the back on flexion of the thigh and inward rotation

Third   Those displaced forward and upward, in which case the head can be felt at the front and sometimes seen, but cannot be felt at the back on flexion and inward rotation

About 80 per cent of the first class give perfect results   Of the second class 60 to 70 per cent give perfect results, while of

Fig 101 —Case of bilateral dislocation with very shallow sockets

the third class only about 50 per cent give perfect results   The bilateral cases are in a class by themselves and these do not give perfect results in more than one-half of the cases   For some reason boys do not, as a rule, give as good results as girls   The outlook, then, in this boy with both hips dislocated is not very promising

I now replace these hips by the same maneuver that I em-

ployed in the other case but instead of the hips slipping out as soon as I let go the legs as I expected they would both remain quite securely in place   The left hip is more secure than the hip in the child first operated upon although from the radiogram we are justified in believing that the socket in the first case was considerably better than either socket in this second case   Both these hips are now put in a plaster splint in right angled abduction with an outward rotation to 90 degrees   In this position as in the other case the child is able to lie comfortably in any bed but *if the limbs are placed with the back of the thighs looking backward* the knees bent to right angles to prevent rotation and the cast carried halfway from the knees to the ankles the child will not be able to lie comfortably in an ordinary bed   In the case of a single hip the foot and leg from the knee down can hang over the side of the bed the foot supported on a stool and the limb covered with blankets but in the bilateral case with both hips in this position the child must lie continuously face down or upon a specially constructed bed narrow enough to pass between the flexed knees   With the knees flexed and covered with a plaster cast it is obviously impossible for the child to walk and inasmuch as it is necessary for the child to walk in the plaster cast for many months before it is removed to deepen and perfect the sockets we are accustomed at the end of four months to cut off *part of the cast below the knee* and allow the limbs to rotate for the sake of enabling the child to walk as we do when at the time of the operation the cast is extended only to the knees   It would seem almost impossible for this child to walk with the limbs in this—frog—position but he will be standing in two or three weeks and ought to be walking in two or three months   To encourage these bilateral cases to walk we sometimes have a stool constructed *or make use of the child s side chair with castors* on the legs of such height that the patient can rest the feet on the floor and push himself about the room

In cases of this age the plaster cast—the first and only one—remains on the child for eight months   In older cases where the shortening of the muscles is much greater *I am accustomed to remove the first cast at the end of about four months and having*

brought the legs down nearer together, put on another cast, and sometimes, later on, a third cast, thus reducing the period of after-treatment by the passive manipulations which would be necessary to bring the legs together

When the plaster cast is finally removed it is an interesting question in all cases whether or not the hips are going to remain in their sockets   I know of no certain way to tell, but if the legs can be readily brought down nearly together and if the joint motion in all directions is very good, I always feel that the hips are insecure, whereas, if the hips are quite stiff and the legs refuse to come down, it is highly probable that the result will be satisfactory

The question is often asked   How long must these children remain in the hospital?   There is no fixed time   These two children operated on today will leave after three or four days, as do most cases   Some cases leave the very day of the operation and are taken home a hundred or two miles before they begin to feel sore   and others, the difficult ones, remain a week or ten days, but I always let a child be taken home as soon as the parent can lift the child from the bed without giving enough pain to cause the child to cry

The third case illustrates one of the partial failures and the way we manage them   This child, a girl now six years old, was born with both hips dislocated   When she was three years old I reduced both hips   The replacement was very easy and the sockets not satisfactorily secure   She was not a strong muscled child   Her mother is a charming little lady and her father a college professor   not the kind that breed strong and tough stock. She wore the plaster cast eight months   The hips were in place when it was removed but the legs came very easily down and were very soon side by side and she walked well   At some later time, just when we do not know, the right hip slipped out   The radiogram (Fig 103) shows the left hip in place at this time and the right hip displaced forward and upward

If our knowledge of the management of these cases was no greater than the knowledge which Lorenz possessed when he came over to operate on the relapsed hip of a celebrated case, our result

might be no better than he obtained, but in the fourteen years
since 1902 we have learned some things We have learned that
some hips that have never been dislocated slip out when the child
walks with the limb adducted, as they have to do with the left
limb when the right limb is in a plaster cast in right angled ab
duction, as in our first case today, and that all replaced hips like
the left hip in this third case will surely slip out if the child walks
with the right leg in a plaster cast in right angled abduction

Fig 103—Recurrence of deform ty on one s de follo ing reduction of b lateral
d slocation three years previously Hip replaced and *both* legs put in plaster
cast

So we will now replace this right (dislocated) hip by the usual
method and put both legs in a plaster cast the right one replaced
today in right angled abduction and the other, replaced three
years ago, abducted only slightly, hardly to the normal degree
of abduction possible when standing This will ensure stability
of the left hip while the right hip is again being tried out

When a replaced hip slips out at some time after the removal
of the cast it is always a question when it ought to be replaced

I believe it to be an error to replace it at once, or even soon It is better to wait and let the child walk on the leg until the shortening amounts to at least 1½ inches Some years ago I replaced both hips in a little girl at about the usual age (Fig 104) At some time after the removal of the cast one hip slipped out, the other remaining securely in place. I waited two years and then replaced the slipped hip. After the first cast was removed, it again slipped out. Then I waited five years and again replaced
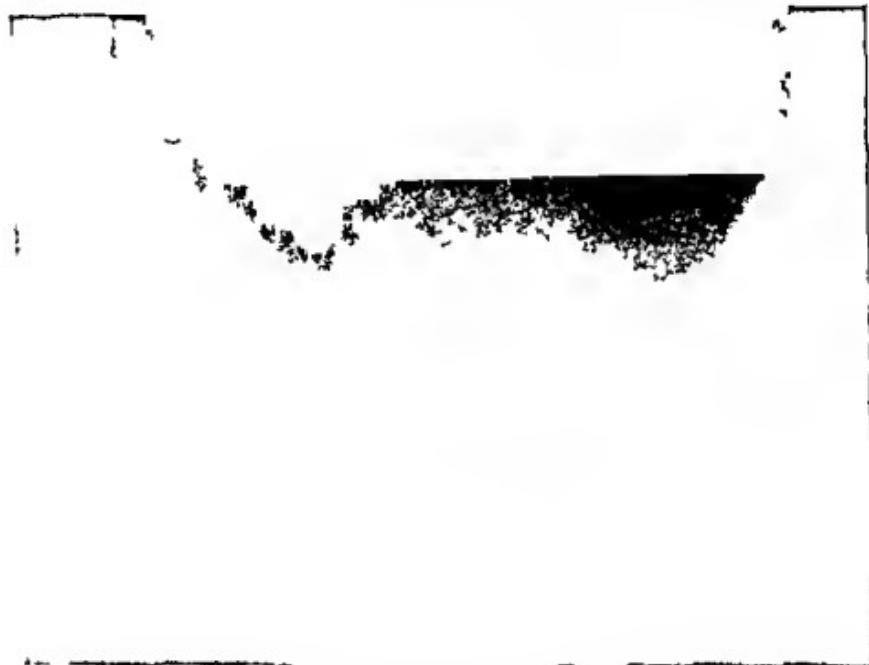
Fig 104—Walked at fifteen months, and limp noticed at eighteen months Hip replaced January 11, 1906 Cast removed September 13, 1907 See final result radiogram August 30, 1913 (Fig 105)

it Since then it has remained secure Here is the radiogram (Fig 105) of a perfect result eight years after replacement, but you will note that the socket is still shallow and larger than the socket on the other side

Here is the radiogram (Fig 106) of a case of anterior transposition with the head turned forward and just above the socket, and an acetabulum so shallow that obviously the head could never be made to stay in place by any manipulation or operative procedure whatever

Years ago I replaced a hip in a little girl and it slipped out
After about six months I replaced it again, and again it slipped out
after the removal of the cast   Then the late Professor Hoffa, of
the University of Berlin, replaced the hip by his cutting opera
tion, boring out and deepening the socket to his entire satis
faction   When the cast was removed the radiogram showed the
hip in place, but at the end of six months it had again slipped out
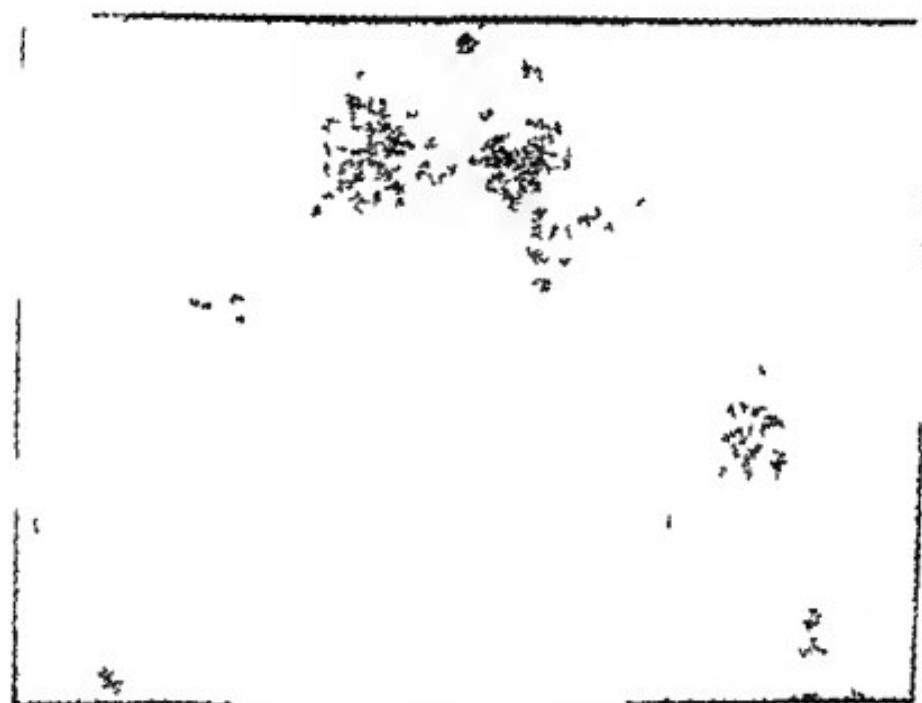
Fig 105 — The radiogram was made eight years after the congenital dislocation
was replaced   Clinically the result is perfect   The legs are the same length and
with the same range of motion and there is no limp nor is there any clinical evi
dence as to which leg was the one operated on   But the radiogram shows clearly
the difference between a normal and a defective hip

Such I am sure would be the result if one attempted to replace
this hip by a cutting operation unless a really stiff hip resulted
from the cutting operation   In my experience all the hips re
placed by the cutting operation that get a good range of motion
ultimately slip out   Only those that are practically stiff remain
securely and permanently in place, for you should know that the
replacement of the hip by any cutting operation adds nothing to

the strength of those parts which retain the hip in its place, but takes away to a greater or less extent the security of the hip

Here is the radiogram of another child (Fig. 107). The hips were replaced when the child was three years and nine months old. After removal of the cast both hips slipped out. They were at once replaced. On removal of that cast both hips were in place. At the end of six months the right hip had passed forward and slightly upward and the left was still in place. By the

Fig. 106 —Anterior transposition with the head turned forward and just above the socket, acetabulum too shallow to justify attempt at reduction

end of a year they were both out. Three years after the first operation I again replaced both of these hips, that is to say, I placed the hips where they ought to be if in the sockets and where the femoral heads could be felt in front below the anterosuperior spines of the ilia and behind the femoral arteries, but in neither hip was there any sign of the head riding over the rim of the socket or of any socket-like depression. Nevertheless, I placed both legs in plaster casts, which she is still wearing. I have practically no hope that these hips will remain in place. Indeed, the

best result I hope for is an anterior transposition With both hips in the anterior transposition the child will stand straight and walk well. The lordosis and prominent buttocks, flexed thighs, and legs will no longer be present, but a slight waddle will remain while walking A younger sister of this child also had both hips dislocated After replacement one has remained in place now for over a year and the other has turned into the anterior position,

Fig 107 —Both hips in anterior transposition The acetabula are so shallow that improvement by operation is hardly to be expected

but can be readily turned back into the socket without discomfort to the child. I am waiting to see how it will be after two or three years more before considering other treatment.

It may be asked, What is the after-treatment when the cast has been finally removed in these cases of congenital dislocation of the hip? Usually none, except a gentle turning inward and stretching downward of the legs by the mother in her efforts to turn the toes directly forward and bring the limbs together

CLINIC OF DR ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

SURGICAL LESIONS OF THE COLON

Summary Indications for operation on the colon divided into two groups, the first based upon the presence of definite organic lesions, and the second, upon a large assortment of so-called functional disorders, operations for the latter *. . .* examples of bad s rgery and poor judgment

diag
nc of
radical cure—resection with ileocolostomy or ileocolostomy without resection as determined by the general condition of the patient and the local findings

Carcinoma of the transverse colon, presentation of case operated on three years previously, discussion of the signs and symptoms and the method of examination

Carcinoma of the sigmoid, the diagnosis, postoperative fecal fistula treated with bismuth paste, general carcinomatosis after four months

Diverticulitis of the sigmoid, clinical similarity to carcinoma, complete relief from symptoms after colostomy, occasional association of diverticulitis and carcinoma

Hernia of the diaphragm probably secondary to carcinoma at the splenic flexure of the colon, importance of looking for a possible cause of increased intra-abdominal tension when investigating hernias of the diaphragm

Polypus of the sigmoid, method of examination which permitted a correct pre-operative diagnosis

Calculus in the appendix causing repeated severe hemorrhages from the bowel

Case illustrating the fallacy of extensive operation on the colon of patients with constipation, but without gross pathologic lesions, these operations are associated with an unwarranted mortality, and in the postoperative history of the majority of cases not only is there no improvement, but distressing complications such as are recorded in the present case, are common, a careful, scientific analysis of the facts must force one to the conclusion that such operations are unjustified

WE have several very interesting cases of surgical lesions of the colon which I desire to discuss with you this morning Within the last ten years a great deal of development has occurred in the surgery of the colon Some admirable advances have

been made and a good deal of questionable surgery has been
done   We might, in fact, divide these cases into two distinct
groups, one where there were definite organic lesions demanding
surgical interference, and the other a group of cases where surgical
operations have been done for functional disorders such as con
stipation and so-called intestinal stasis   Where there are organic
lesions of the colon producing definite symptoms which can be
relieved by surgical operations a great deal of good can be ac
complished   Personally, I feel that the operations that have been
done for functional disorders have for the most part, been ex
amples of bad surgery and poor judgment   I have analyzed
this latter group with a good deal of care from the standpoint
of a study of the literature of the subject and from the cases
which I have observed in my own clinic and in the clinics of
others, and I have been forced to the conclusion that the surgical
operations done on the colon for the relief of constipation and for
intestinal stasis, for epilepsy and for various lesions, such as ex
ophthalmic goiter tuberculosis, and cystic disease of the mam
mary glands, on the vague and uncertain hypothesis that the
conditions in the colon that could be removed by surgical opera
tion are responsible for these conditions have no value, and in
fact the time has come when this sort of surgical therapy should
be relegated to the museum of surgical errors and curiosities,
which have no value and which are the result of mistaken enthusi
asm often amounting to an obsession

I shall first present a series of cases in which there are organic
lesions demanding operative interference and shall operate upon
several of these this morning   I shall then present to you several
patients who illustrate clearly I think how unwarranted many
of the operations are that are being done for constipation without
an organic lesion

CASE I

The first case is a very interesting one which Dr Ralph
Brown has referred to our clinic, and he has been kind enough to
come here this morning to present the clinical picture and the
clinical diagnosis   Then we shall make an exploratory operation
and see what can be done for the patient

Dr Brown The patient is a man thirty years old, who first came in on our service in November, 1910 giving the following history

The patient was in Oklahoma in August and September, three months previous to his admission He began to be troubled with constipation about the 4th of August and also a slight elevation of temperature in the evening No headache, nosebleed, nausea, or vomiting were present He went to a hospital in Oklahoma about the 5th of August, 1910 The patient states that there was a difference of opinion among the doctors One thought the case was appendicitis and another diagnosed intestinal obstruction He had very little pain but had tenderness in the abdomen Another doctor thought it was typhoid He continued running a temperature, and on the 7th of September had a hemorrhage from the bowel He thinks he had about four or five hemorrhages losing about 17 ounces of blood at one time It was easily distinguished as red blood He became unconscious as a result of the loss of blood He became better, and remained about the same until he came to Chicago the latter part of October He had diarrhea at times during the latter part of the sickness

At the time the patient entered the Presbyterian Hospital the physical examination was negative with the exception that he was very thin and emaciated and anemic looking His abdomen was somewhat tender but there were no evidences of any fluid in the abdomen or any palpable masses He was at that time running a temperature of a septic type with remissions daily to nearly normal and then running up to 103° and 103 6° F This was in the latter part of November This temperature continued until the first of January The record from the Oklahoma hospital showed that he had been having the same type of temperature during all of September and October

Here is a clinical picture in which a man was taken sick rather insidiously with a temperature from the early part of August until January, associated first with constipation and later with a marked diarrhea and relatively early in the case he had severe hemorrhages from the bowel Examination at this time (No-

vember 1910) showed the presence of blood in the bowel movements The Widal was negative His blood findings were those of a high grade secondary anemia—45 per cent hemoglobin 8000 leucocytes 4 088 000 red cells Upon diarrheal management he recovered and gained about 40 pounds in weight and remained fairly well for a period of about two years

He returned to the hospital in May 1911 giving a history of a recurrence of the diarrhea but under diarrheal management he regained his weight and was able to resume his occupation as a traveling salesman

We next saw him in May 1916 and at that time he gave the following history In 1914 he had a recurrence of the diarrhea with five or six stools a day He thinks he had some fever during those attacks of diarrhea which would recur occasionally In 1915 the diarrhea became more constant six stools a day with loss of weight and strength and finally he became so weak that he was unable to walk At Thanksgiving 1915 an operation was performed at one of the Chicago hospitals supposedly for appendicitis We have the report of the operation which I shall read

An incision is made in the region of the gall bladder The peritoneum is free but the transverse colon the hepatic flexure of the colon and the ascending colon are all matted together and drawn into a knot in the neighborhood of the appendix It is clear that the pathologic condition is tuberculosis The glands in the neighborhood of the mesentery are enlarged The abdomen is closed without delay

The patient was put upon x ray and violet ray treatments He had some diarrhea from the time of the operation He came to us in April 1916 At that time his condition was very bad His blood findings showed 12 000 leucocytes 3 500 000 reds and 56 per cent hemoglobin He was having eight or ten stools a day He was having so much abdominal pain that he required ¼ grain of morphin four times a day His temperature was of a septic type fluctuating from 99° to 103° F The physical findings were negative with the exception of the abdomen The abdomen was extremely rigid and over the cecal region there was

evidence of fluid, and one got the impression that there was a tumor mass, although the abdomen was very rigid Proctoscopic examination showed a pale but otherwise normal mucous membrane up as far as 17 cm from the anal ring There was no evidence of any ulcerated or suppurative condition of the mucous membrane of the sigmoid His lung findings were normal At that time there was no evidence of any obstructive process in the colon

He was placed upon accurate diarrhea management and in nine weeks left the hospital, having gained 15 pounds, with a normal temperature and practically normal bowel movements In the course of about two months he had gained 40 pounds and looked perfectly well and was having normal stools His hemo globin had risen to 77 per cent by September He left the hos pital in June

In September he came to me again, complaining of continuous pains in the abdomen with a tumor mass which he could feel just to the left of the cecum Examination at that time showed the presence of a very distinctly palpable mass in the region of the cecum It seemed quite certain from the physical findings and his description of the pain that he had an intestinal obstruction based upon what was apparently a mass involving the walls of the cecum Of course from his previous history and the findings at the operation it was apparent that he had a tuberculous process in the colon and to make sure I gave him a tuberculin test sub cutaneously and got a very little rise of temperature on a 0 1 mg dose The next injection of 0 5 mg gave only a rise to 100° F Then I gave him 5 mg and there was an extremely marked reac tion His temperature went to 104° F That seemed conclusive evidence as to the nature of the pathologic process Then we attempted to define the limits of it by the fluoroscopic and radio graphic tests It was perfectly clear from the tests that he had some infiltrative process involving the cecum and certainly the ascending colon He was advised to have surgical relief, but thought he had better wait so was sent home

He came back a couple of weeks ago complaining of so much pain that he would have to have relief x Ray plates with barium

were made, the barium being introduced with a tube At the end of about seven hours there was still a retention of a great bulk of the barium in the lower part of the ileum He is having a suffi cient amount of pain to justify him in seeking relief It is evi dent that he has a very high grade obstructive process in the cecum involving a considerable portion of the ascending colon, and very likely we will find that the hepatic flexure itself is involved, because you can see in this plate that the hepatic flexure *is pulled down and is probably involved in a mass of adhesions* in the region of the ascending colon

This case has been interesting from a number of points It is interesting to me in the way in which it demonstrates that tuber culosis is essentially a benign process Here is a man who has had tuberculosis for years It has produced a high grade of sepsis and emaciation The pathology of the case is of great interest be cause it shows one type of tuberculosis of the intestines, namely, the hyperplastic type, in which the lesion involves the cecal region and produces pathologic findings closely simulating malig nant disease It is also interesting because of the appearance of the hemorrhages of high grade early in the course of the disease Clinically that is not common It makes it easy to understand why the diagnosis of typhoid was made The nature of the tuberculous process as it first involves the gut is usually a slow ulcerative process with the production of sufficient granulation tissue to protect the surrounding tissues against perforation The nature of that pathologic process is such that we do not very often get hemorrhage to the degree that we did in this case For the same reason we rarely get a perforative peritonitis from the perforation of a tuberculous ulcer

It may interest you to know that with microscopic work on the stools we were never able to demonstrate tubercle bacilli

As to the pathogenesis of tuberculosis of the bowel in gen eral we may say that it is far more frequent than we ordinarily have any reason to suspect Kaufman states that postmortem statistics show that tuberculosis of the bowel occurs in about 90 per cent of the cases of pulmonary tuberculosis In our case repeated examinations have never shown a pulmonary lesion

Dr. Bevan: We are very much indebted to Dr. Brown for his presentation of the history of this case.

While the patient is being anesthetized I would like to say a few words in regard to the subject of surgical tuberculosis in the abdomen, using this case as a text. Of course we find a great many different clinical pictures. In a general way there are two types, at least as far as the involvement of the abdominal structures is concerned, one an involvement beginning in the peritoneum, the other beginning in the mucosa of the alimentary tract. A peritoneal tuberculosis is usually a hematogenous infection. You can understand that tuberculosis involving primarily the mucous membrane may be secondary to a lung infection from swallowing tuberculous sputum, or is a direct infection from food contaminated with tubercle bacilli. These two general types present very different symptoms. The type in which you have a hematogenous involvement of the peritoneum comes to the clinic very often as a case of hydrops with free fluid in the peritoneal cavity, and the differentiation has to be made between the different causes for fluid in the peritoneal cavity, such as lesions of the kidney, lesions of the heart, etc. Those cases come to the clinic very often with symptoms suggestive of other lesions, such as appendicitis, as gall-stone disease, with lesions such as tubal involvement in the female. In a general way the other type of tuberculosis involving the intestine comes to the clinic with two forms of complaint—the first, usually the presence of blood in the stools, and the second, evidence of more or less obstruction. Those are the two general forms in which abdominal tuberculosis is presented.

Now as to the case in hand. This case has been, I think, very carefully and scientifically worked up, both by the surgeon who operated previously and by the attending medical man. The case has been very carefully analyzed from every standpoint. He has already had an exploratory operation by a very good surgeon, who recognized that there was an extensive tuberculous process, and believed at that time that the best policy was general hygienic treatment. He was undoubtedly right at that time because the patient's condition was so very bad. As Dr. Brown

has told you, the patient comes to us now with a pretty definite pathologic diagnosis and anatomic diagnosis, the pathologic diagnosis as determined by the previous exploratory operation and the general clinical picture and the anatomic diagnosis as determined by a mass which is distinctly palpable and more definitely determinable by a very careful *x* ray examination From the evidence obtained the obstruction probably extends from the middle of the transverse colon to a point a little above the ileocecal region The important clinical fact is that he has definite intestinal obstruction of a chronic type that must be relieved

What are we going to do about this case? In view of the definite and rather high grade obstruction, I quite agree with the conclusion that has been arrived at that we should give this man the benefit of surgical relief What can we do in a surgical way? One of two things either a removal of the entire mass and a side to-side anastomosis, between the part of the ileum that is not involved and the part of the transverse colon that is not involved, or, if this is impossible or is not advisable then simply an anastomosis between the part of the ileum not involved and the part of the transverse colon not involved

The statistics on this subject are very interesting Where it is possible and good judgment considering all facts in the case a radical operation should be done because it gives a much better prospect of a permanent and complete cure On the other hand there are a certain number of cases in which it is not easy to do this and good judgment would dictate an anastomosis rather than a very severe operation carrying a large risk with it

Operation—We shall operate upon this patient under ether anesthesia I am making the usual midline laparotomy below the umbilicus There is one interesting fact that we may find The previous operator found when he explored this abdomen that the peritoneum was studded with tubercles We may find that they have all disappeared We have had that experience a number of times at the second laparotomy A peritoneal tuberculosis which was very distinct at the first operation had disappeared so completely as to leave no trace

As I open this peritoneal cavity I find that the peritoneum is

quite smooth and shows no evidence of tuberculous peritonitis. The first thing that comes into view is the small intestine, which is very greatly distended. As I examine this, I find that it is the lower end of the ileum. As I follow it to the ileocecal valve I come to a very large, hard, nodular mass which is an ileocecal tuberculosis. It will be necessary, in order to expose this lesion fully, to extend my incision up above the umbilicus, which I now do, exposing the abdominal contents more thoroughly, and follow this mass from the cecum upward, and find that it involves the ascending colon and about one-half of the transverse colon, and

Fig. 108.—Ileocolostomy. Lateral anastomosis between transverse colon and ileum.

that the left half of the transverse colon is normal and not involved in the process (Fig. 108). It is a question whether we should make here a resection or an anastomosis. The man is in fairly good condition, and inasmuch as a resection will hold out a much larger chance of permanent cure, I am going to undertake this more formidable operation rather than do a simple anastomosis.

I divide first the outer layer of the mesocecum and the mesocolon of the ascending colon. This is a non-vascular layer. I bring the cecum, ascending and transverse colons, and the first 1½ feet of the ileum out of the wound. I then ligate the mesen-

tery of the last foot of the ileum and the mesenteries of the cecum, ascending, and half the transverse colon. I cut the mesentery

Fig 109 —Hyperplastic tuberculosis of cecum

distal to the ligature. I now clamp with heavy crushing clamps the ileum well beyond the tuberculous process, and tie a strong silk ligature around the bowel where I have crushed it with the

clamp, and divide the bowel beyond the clamp and invaginate the divided ileum with two purse-string sutures so as to close completely the intestine at this point. I do the same with the transverse colon, so that I now have the entire mass removed and the transverse colon at a normal point completely closed and the ileum at a normal point completely closed. I now make a lateral anastomosis between the transverse colon and the ileum, just the way that we would do a gastro-enterostomy (Fig. 109). I am using in this anastomosis three rows of sutures, one for the mucosa, one for the muscularis and peritoneum, and the third a Lembert suture. The structures are now dropped back into the abdominal cavity and the wound closed, leaving, however, two cigarette-drains about the size of my little finger down to the point of anastomosis.

I shall ask Dr. Brown to demonstrate the specimen.

DR. BROWN: This is an unusually beautiful pathologic specimen, and shows practically all the features that are characteristic of the hyperplastic type of tuberculosis which has this ileocecal region as its site. First of all, there is this enormous thickening of the wall, which in some places has the thickness of fully an inch. Before opening the gut it was apparent that there was a point of very marked stenosis, and that is situated about 3 inches proximal to the ileocecal valve. There is an opening here which will hardly admit my little finger. Upon opening the gut there are to be seen areas of ulcerations with scar-tissue formation. There is one ulcer nearly healed which formed the basis of this marked constriction in the lower part of the ileum. There is another ulcerated area here in the ascending colon—a nearly healed ulcer. The most striking part of the picture is the enormous polypoid development of the mucous membrane between these tuberculous ulcerations. Some of these polypoid formations are fully an inch in length.

CASE II

The second case is a patient I operated upon four years ago, and I am presenting him to you as an unusually gratifying result in colon surgery, a case of carcinoma of the transverse colon re-

sected in 1913 The patient made an excellent operative re
covery, and has remained well without recurrence for more than
three years The history is as follows

Mr N H, age sixty five Referred by Dr Sippy Patient
entered the hospital October 9 1913 He has always been in
good health until the spring of this year, when he began to have
pain in the abdomen This pain is distinctly colicky, cramp like,
and quite severe at times It is usually present each day, but
may be absent for as long as *two or three days at a time* Pain
usually lasts one or two minutes at a time, coming and going
throughout the day It is almost always accompanied by a desire
to defecate and the passage of stool or flatus invariably gives
relief Patient states that lately there has been an almost con
tinual desire to go to stool He usually has four stools a day the
tendency being to mushy movements Rumbling and passage of
flatus has increased markedly of late and much mucus but no
blood has been passed The pain always starts in the supra
pubic region and the patient is sure that he can feel an increased
resistance or a lump under the skin on the left side but he has
felt no movements in the abdomen Nausea is present at the
height of distress but vomiting has occurred only once He
has lost about 10 pounds in weight in the last few months and has
noticed that he is much weaker He has limited his diet to almost
nothing on account of the pain

On physical examination the patient appears to be a fairly
well nourished individual although he has evidently lost some
weight Except for an adenoma in the left lobe of the thyroid
and tinea versicolor over the chest there are no physical abnormali
ties outside of the abdomen There are marked peristaltic waves
over the abdomen and splashing is heard upon succussion just
above the umbilicus Gurgling is present before bowel move
ments Upon dilating the stomach with soda and tartaric acid
distinct peristalsis is visible but separate bowel peristaltic waves
are also present rising as transverse ridges below the stomach
and accompanied by cramp like pains Repeated seven hour
motor meals show no retention of food An Ewald test break fast
—total acidity 71, free hydrochloric acid, 59 On several occa

sions aspiration showed no free acid and a positive guaiac test for blood. This was thought to have been due to traumatization of the aspirating tube. Twenty-one stools examined for blood were negative and 15 were positive. Microscopic examination of the stools failed to reveal pus. A barium injection shows a definite defect of the large bowel in the region of the splenic flexure. The diagnosis made by Dr. Sippy before the patient was transferred to the surgical service was chronic intestinal obstruction of the splenic flexure of the colon due to malignant growth.

Operation Notes.—Under ether anesthesia the Bevan S-shaped incision is made on the left side. An annular carcinoma of the transverse colon at once comes into view. There is no evidence of glandular involvement or of secondary deposits in the liver. Exploration fails to reveal a lesion of the stomach. There is marked hypertrophy of the proximal portion of the bowel. About 8 inches of the colon are resected, including the tumor growth. The ends are closed with three rows of linen sutures and the usual three-row lateral anastomosis made. The wound is closed without drainage.

I am very glad to have the opportunity of presenting this case to you because it illustrates very well the possibility of permanent cure in carcinoma of the large bowel if the case is operated upon at a time when the lesion is limited entirely to the intestine and to the block of tissues that can be removed at the time of the operation. Fortunately, in this case the circular carcinoma gave very early and definite symptoms, and fortunately for the patient he was referred to Dr. Sippy's service, where the condition was at once diagnosed and he was given the benefit of radical surgery.

CASE III

The third case, patient W. S., sixty-six years of age, presents a number of unusual and interesting features. The history is as follows:

Patient entered the hospital September 13, 1916, with the following complaints: pain in the abdomen; marked constipation; rumbling of gas in abdomen.

About the 1st of July the patient began to have some indefinite pains that he thought were due to indigestion—also some constipation About August 1st (five weeks ago) patient began to have rather severe cramp like pains in the left side of the abdomen accompanied by marked rumbling At the onset pain would occur on the second day after a bowel movement usually beginning in the afternoon Constipation grew progressively worse until cathartics would not produce a movement At one time he went seven days with no movement in spite of the free use of cathartics and enemas He had five copious stools at the end of this time During this period the abdomen was very distended and so tender it could not be touched Vomiting occurred once

Patient has always been well until a year and a half ago at which time he had pneumonia His bowels have always been regular without the use of cathartics until four months ago He was shot through the mouth ten years ago the bullet taking out some teeth and grooving his tongue Six or seven years ago he developed a small sore *at the corner of his mouth* which disappeared and reappeared at intervals until last February when it commenced to grow He was operated upon by Dr Bevan July 7 1916 and an epithelioma removed There has been no evidence of recurrence

One year ago the patient weighed 250 pounds His present weight is 200 pounds His appetite has always been excellent until lately when he has limited his diet on account of the pain His family and venereal histories are entirely negative

Physical examination does not reveal anything of importance except that the abdomen is covered by a thick layer of fat and is very distended and tender which makes palpation of any tumor mass out of the question Leukocyte count 9050 hemoglobin (Dare) 92 per cent blood pressure 150 urine negative

Fluoroscopic examination shows an area in the sigmoid 3 or 4 inches below the splenic flexure which does not fill There is a small shadow through this area Plates show an almost complete obstruction about *2 inches in length 2 inches above the crest of the ilium*

Operation.—Under anesthesia a large muscle-splitting incision, similar to an appendix incision, is made on the left side. A circular constriction of the large intestine is found at the site
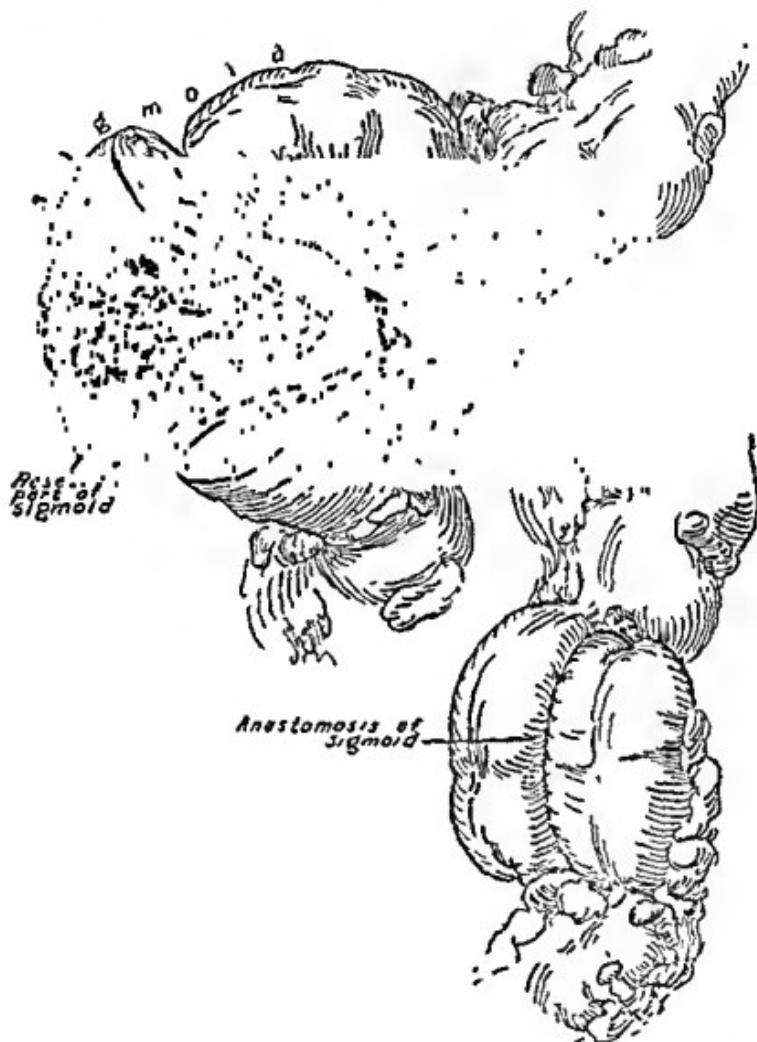

Fig. 110.—Lateral anastomosis between two loops of sigmoid following resection for carcinoma.

shown in the x-ray. This may be a carcinoma or diverticulitis. The outer leaf of the mesentery of the descending colon is divided by blunt dissection and some adhesions are separated. The blood supply going up in the inner layer of the mesentery of the

sigmoid is ligated   The operation is made very difficult by the large amount of fat in the abdominal wall and in the abdomen   The tissues are very friable and in an attempt to handle the distal stump of the resected bowel by ligation and invagination *the ligature slipped off the friable tissues making a three row suture closure necessary*   Fortunately, the abdomen is not soiled   The proximal end is likewise closed with three rows of sutures   Five inches of intestine are resected   On opening this we find that the lesion is definitely carcinoma   The usual side-to-side anastomosis is made (Fig 110)   There is no evidence of glandular involvement   The wound is closed, leaving two cigar ette drains to the site of anastomosis

This man made a fairly good operative recovery, although the wound suppurated for a time and a fecal fistual developed in the center of the laparotomy wound   Fortunately this closed com pletely without necessitating further operative interference   The closure I think was materially aided by injecting the fistula with a very thick stiff bismuth paste for a number of weeks after the operation   Unfortunately now at the end of about four months he shows evidence of a general carcinomatosis with defi nite lung involvement   This is one of that large number of in testinal cases where the condition was not recognized until the process had already become wide-spread and probably systemic before operation was undertaken

<center>CASE IV</center>

The next patient which I present to you is a very interesting duplicate in a way and at the same time a contrast to the pre vious case   The patient s history is as follows

Patient Miss S R age sixty eight   She entered the hos pital September 7 1916 and at the time of admission gave the *following history*

She has been perfectly well until four weeks ago but has had intermittent trouble ever since   During this time she has lost 10 pounds in weight her maximum being 115 pounds   The trouble began acutely with nausea vomiting and pain in the lower part of the abdomen   This pain was low down in the pelvis

and accompanied by some discomfort in the sacral region   After some hours' duration the pain subsided sufficiently to allow the patient to sleep   The following morning she had several attacks of pain of the same character lasting but a few minutes at a time   There was an accompanying desire to go to stool, but patient had no bowel movement   Since then she has had the same straining at stool every two or three days accompanied by cramp like pain which would be relieved by bowel movement   There is no history of the passage of blood or mucus   There has been no gurgling or rumbling since the onset of her trouble   Her appetite has been poor and her diet markedly limited

Physical examination reveals a poorly nourished woman Both kidneys are palpable to the first degree   The descending colon and cecum are palpable, but not tender   Rectal examination shows a mass which is movable and smooth and just within the reach of the palpating finger   This mass could not be palpated abdominally

x Ray examination demonstrates an almost complete stenosis of the sigmoid about 12 inches above the anus   There is marked enlargement of the sigmoid above this point   Leukocyte count, 8700, hemoglobin 73 per cent (Dare), urine negative

Stools are all negative to the guaiac test for blood

Operation—Under ether anesthesia the usual midline suprapubic laparotomy incision is made   There is a large mass, probably carcinoma, plastered to the rectum   Mesentery of the sigmoid is short adding to the difficulties of the operation   The mesosigmoid is cut and the peritoneum separated from the upper part of the rectum   The bowel is now ligated well below the mass and cut in two   The rectal stump is invaginated with two purse-strings over the ligated end   The peritoneum that has been stripped off the sigmoid is used with the left broad ligament to cover over the rectum and wall off the pelvis   The peritoneal cavity is left perfectly smooth   The sigmoid is divided above the tumor mass resecting about 8 inches of bowel   A left sided muscle-splitting incision is made   The free end of the bowel which has been cauterized is brought out through the incision and stitched in position, making a permanent colostomy

The patient's pulse is somewhat rapid at the close of the operation, but her condition is good.

We had here what to gross appearance looked very much like the lesion in the previous case, and we regarded it as a carcinoma. A very careful histologic study, however, has shown that it was

Fig 111.—New inguinal anus   Portion of bowel resected for chronic diverticulitis.

a huge mass of tissue involving the sigmoid developing from a diverticulitis and peridiverticulitis; the microscopic examination has failed to show any evidence of carcinoma.

This patient, as you see, has made a very satisfactory operative recovery. The mass was situated in the sigmoid very close

to the rectum, so that even had we known at the time of the operation that the process was not malignant, it would have been difficult to handle the bowel in any other way than that of making a permanent colostomy, at least with any degree of safety   This case illustrates a considerable group of cases which we have had where at the time of operation it was impossible to make a definite diagnosis between carcinoma of the sigmoid and peridiverticulitis   Then, too, there is this to be said, that not infrequently cases of peridiverticulitis which do not show any evidence of carcinoma at the primary operation are followed later by definite malignant recurrences, demonstrating the fact that they were carcinoma in the first place, although there were no evidences of the latter in the microscopic section

CASE V

I want now to show you a gross pathologic specimen from another colon which is unique in my experience and which, I think, is very instructive   The patient was referred to me by Dr Bertram Sippy with the demonstrated diagnosis of "hernia of the diaphragm," and was operated upon for that lesion   The history is as follows

Mrs E L, age fifty five

Present Complaint—Pain in abdomen, vomiting, difficulty in swallowing, weakness, jaundice, loss of weight, and constipation

Onset and Course—Patient states that her present illness began suddenly ten weeks ago with a sharp pain in the abdomen just above the umbilicus associated with vomiting, jaundice and a general feeling of depression   At the onset the pain was not severe except when she was up and about or after food taking but was present to some extent all the time   This condition continued to grow gradually worse until six weeks ago, at which time she was forced to remain in bed because of the severity of the pain   Since then the pain and vomiting have been markedly increased and have been very severe, at times independent of exertion or of food taking   *Pain* is sharp, cramp-like and usually across the abdomen just above the umbilicus   It radiates mostly to the left side   It has never been definitely localized at any one point and there has been very little in either the right

lower quadrant of the abdomen or in the region of the gall bladder There has been no radiation of the pain It has always preceded the attacks of vomiting and has been most severe after food taking or exertion The pain is relieved by vomiting by rest in bed with knees drawn up, and by drinking small amounts of water Relief seems sometimes to be obtained from bowel movement The *vomiting* has always been preceded by severe, sharp pain At its onset it appeared only after the pain but lately it has been independent of everything else, occurring at irregular intervals

Difficulty in swallowing solid foods began six weeks ago, and since that time all solid foods have been vomited immediately They seem to stick and not to pass into the stomach There has been no difficulty in drinking small amounts of liquid

According to the patient, there has been some *jaundice* but a careful investigation among her friends does not reveal any history of a well defined jaundice

Patient states that her *bowels* have always been constipated and that she has taken cathartics for several years The bowel movements have always been soft and mushy For the past six weeks she has been unable to obtain a movement without the aid of enemas and results have been very slight even with these Rumbling and gurgling in the abdomen has occurred a number of times a day associated with cramp-like pains

Her maximum *weight* was 210 pounds (three months ago) Present weight is 153—a loss of 57 pounds

Past History—Patient had the usual diseases of childhood, malaria about thirty years ago She also had some stomach trouble twenty five years ago but with the exception of colds she has been well since that time until the onset of the present trouble Her menopause occurred at fifty one and there has been no bleeding since

Physical Examination—The head and neck are negative except for marked pyorrhea There is a decided acetone odor to the breath There is slight respiratory mobility, there is prolonged roughening of expiratory breath sounds over the left posterior border of the lung and a high pitched note on percussion over the

same area. The left border of the heart is 10 cm. from midsternal line. Rhythm is regular. The tones are faint, but no murmurs are to be heard. There are no localized areas of tenderness in the abdomen and no tumor mass can be palpated.

x-Ray Findings.—As barium was swallowed it was seen accumulating in the position, apparently, of the lower end of the esophagus. By placing the patient on the right side on the table the shadow was found to project above the diaphragm and to be continuous with the stomach shadow below the diaphragm. With the patient properly placed this was definitely shown not to be continuous with the esophagus, and to be a hernia of the stomach into the thoracic cavity.

I will show you the postmortem findings: Here is a small carcinoma at the splenic flexure of the colon which was entirely missed at the time of the operation. As we analyze the facts there can be no doubt but that it was this carcinoma causing a gradual distention of both the large and small intestines, especially the large intestine proximal to the malignant obstruction which was the causative factor in the production of the hernia of the diaphragm. In other words, the increasing intra-abdominal tension due to the carcinomatous obstruction finally reached such a point that the esophageal opening was gradually stretched and a considerable part of the stomach was forced through this opening in the diaphragm into the thoracic cavity. I do not know that this condition has been noted before, but clearly we have here an example of obstruction in the intestinal tract with increasing abdominal tension producing a diaphragmatic hernia. Certainly in the future in cases of diaphragmatic hernia I shall take into consideration the possibility of an increase of intra-abdominal tension from an obstruction being the etiologic cause.

The operative notes on this case are as follows: Ether anesthesia. A large S-shaped incision through the left rectus. On opening the abdominal cavity and introducing the hand along the stomach to the esophageal opening a very large esophageal opening is found, through which a part of the stomach has passed into the thoracic cavity. The intestines, especially the transverse colon, are greatly distended with gas. I examine the colon
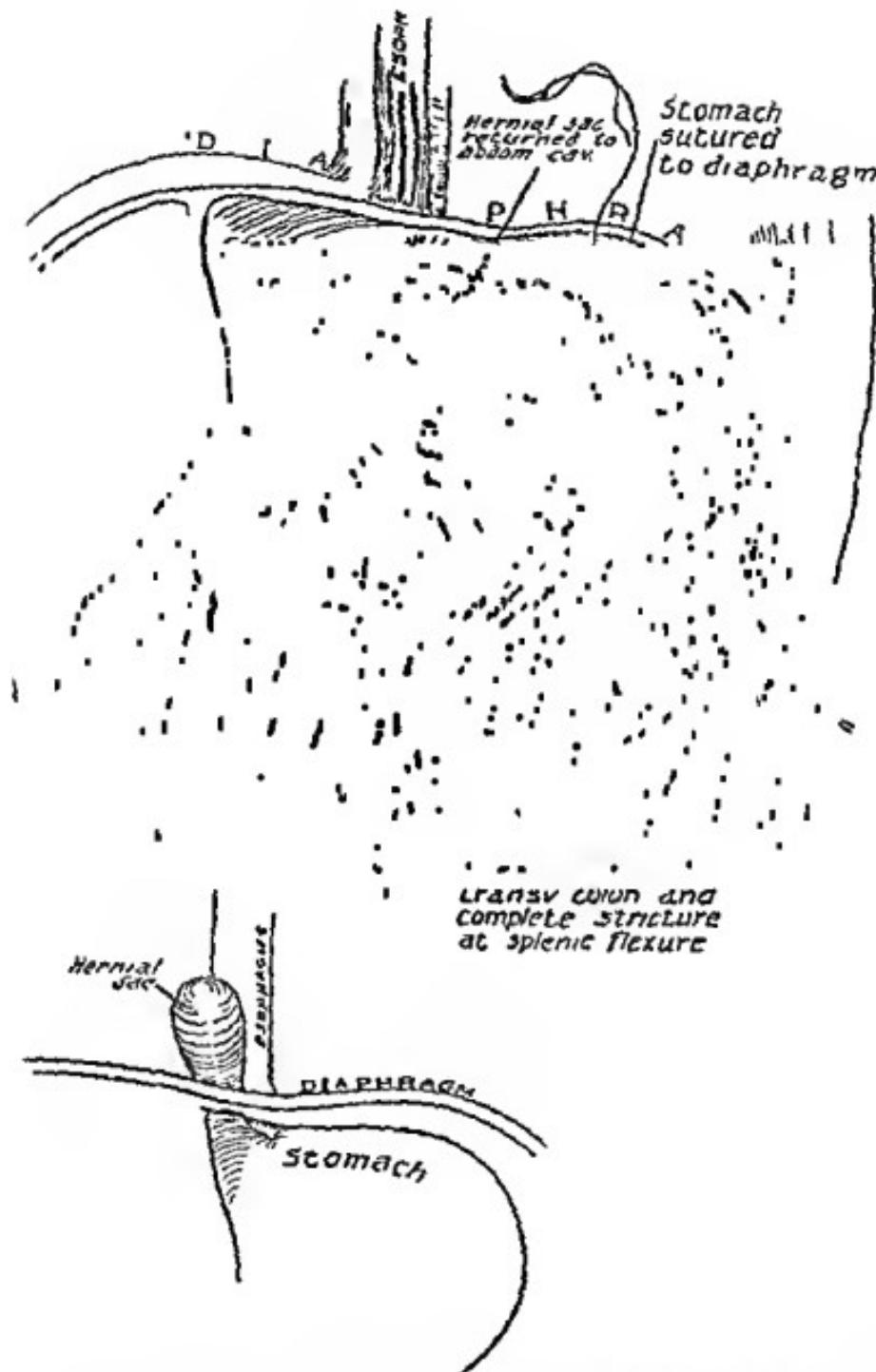
Fig 112.—Diaphragmatic hernia secondary to carcinoma of the splenic flex
ure of the colon The sketch inserted in the lower part of the plate represents the
relative size of the hernia as found at operation

below this point down as far as the rectum, but can feel no obstruction. I complained bitterly to my assistants that the patient's bowels had not been thoroughly cleaned out before the operation, but they said they had followed the usual routine of mild cathartic and enema, and the nurse had reported that these were followed with good results There was so much difficulty in reaching the esophageal opening on account of the distention of the bowel that I satisfied myself by stitching the herniated part of the stomach, after I had drawn it down, to the diaphragm with two rows of sutures The abdominal wound was closed Pads and sponges were accounted for.

The patient died within twenty-four hours apparently from shock and great distention of the abdominal cavity. It was not until the postmortem was made that this small circular carcinoma of the splenic flexure was found (Fig 112).

CASE VI

The next case is one in which most careful and prolonged observation and examination led to a brilliant diagnosis Dr Sippy met me at the hospital one morning some time ago and said that he wanted me to operate upon a patient with a polypus of the sigmoid I said, "Can you feel the mass?" He said, "No" I said, "Then how did you make the diagnosis?" He said, "I have had her under observation for some time She has had bleeding from the rectum for a number of years Her general condition is good, so good, in fact, that with the long history of bleeding carcinoma is probably eliminated Examination of the rectum and lower sigmoid with the proctoscope shows no cause for the hemorrhage A careful examination shows nothing abnormal in the stomach or duodenum The blood is either bright red or in clots When we have a constipated stool there is no blood in the center of the stool mass, but simply on the external surface The center of the stool is Weber negative The outer surface is Weber positive These stool masses are formed in the sigmoid, therefore I conclude that the lesion is in the sigmoid, that on account of its long history it is not carcinoma, and, therefore, probably polypus"

The operative notes are as follows On January 8th the patient
was transferred from the medical service with a diagnosis of
polyp of the sigmoid   Under ether anesthesia a midline supra
pubic incision is made   Careful exploration reveals a few ad
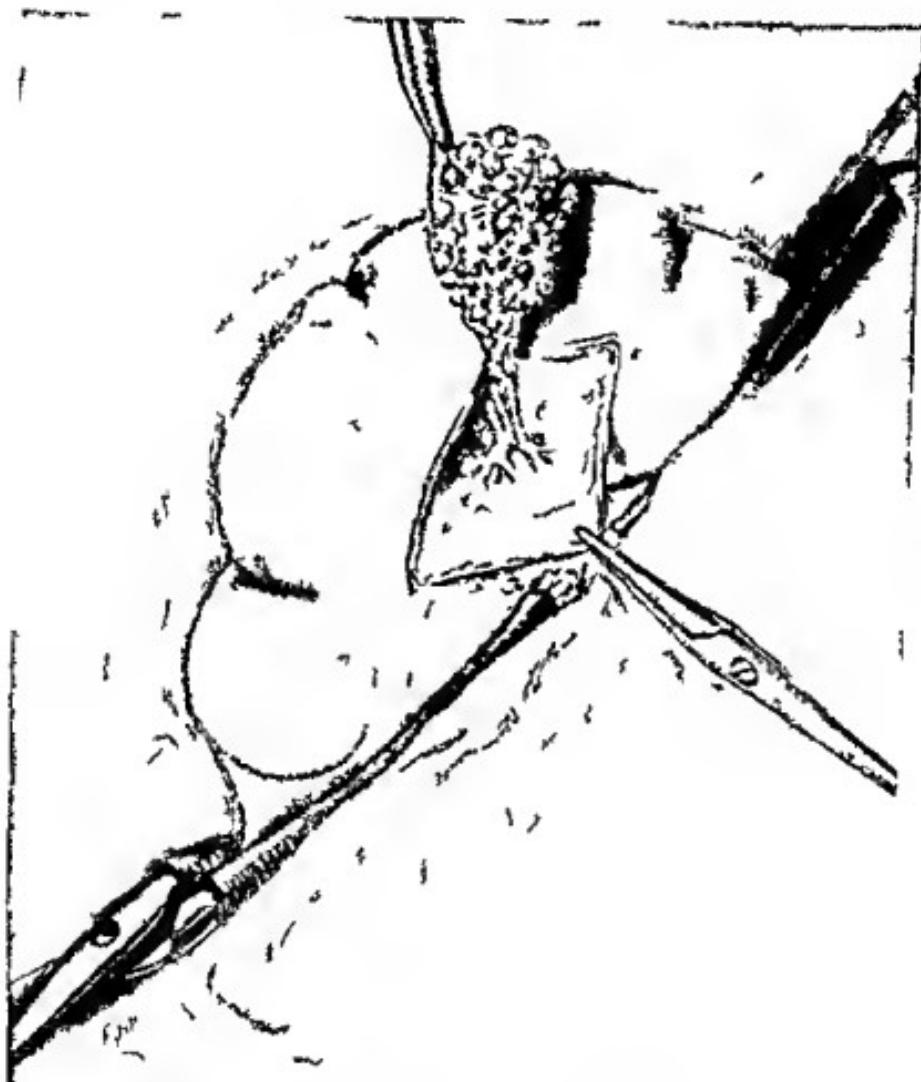
Fig 113 —Removal of polypus from the sigmoid

hesions about the sigmoid which are not sufficient to account for
the symptoms   In the lower portion of the sigmoid there is a
nodule about the size of a walnut which is evidently attached to
the wall of the bowel   Two stomach clamps are placed upon the

gut to prevent extrusion of feces and a longitudinal incision made over this mass. An eroded pedunculated mucous polyp comes into view. This is removed by ligation of the pedicle and closure of the raw area with linen (Fig. 113). Bowel is now closed by three rows of linen. The abdomen is closed without drainage.

The patient made a good recovery and has had no evidence of hemorrhage since operation. Microscopic examination showed the specimen to be a polyp.

CASE VII

A second most interesting colon case with hemorrhage is the next one, a patient of Dr. Frank Billings. The patient has had for six years repeated severe hemorrhages from the bowel. These have not been associated with pain, and, although she has been under most careful observation for a long period, the cause of the hemorrhage has not been demonstrated. The patient is a married woman of forty-six. The hemorrhages have occurred at intervals and have been so severe that after some attacks the hemoglobin would go down to 40 per cent. The history of the case was very much like the one that I have just described. The bleeding had been going on intermittently for six years. There was no evidence of carcinoma. *x*-Ray examinations with barium injection in the colon were negative. Proctoscopic examination was negative, and for some time it was felt that the hemorrhage must be due to some constitutional condition and that medical management was indicated. However, as the condition persisted without relief, Dr. Billings suggested that an exploratory operation be made. When I analyzed the facts in the case I thought that we had to deal, probably, with a polyp in the colon at some point, and ventured that as the most probable diagnosis.

Operation under ether. Exploratory incision in midline. A most careful examination of the alimentary tract was made. The large bowel was empty and contracted. The sigmoid was examined and no polyp or lesion of any kind could be found. The cecum was rather contracted. Appendix examined. It was found to be large and contained a large fecal stone at the junction of the appendix and the cecum, the stone seeming to project into

fills up the cecum and ascending and transverse colon and remains in that position for weeks The same condition occurs if the barium meal is given from above There is evidently a large neurotic element in her case but there also is now a very definite gross mechanical difficulty in the intestinal tract At times very marked peristalsis of the intestines can be seen and felt and this is associated with cramp like colics and great distress

After analyzing all the facts with Dr Sippy we concluded to restore the intestinal tract to normal and then place the patient upon scientific medical management for her constipation

Operation—Under ether a midline laparotomy incision was made below the umbilicus The anastomosis between the ileum and the sigmoid was brought into view The cecum ascending and transverse colons were found packed full of fecal matter The anastomosis between the ileum and sigmoid was separated and the opening in the sigmoid was closed and the integrity of the ileum was restored by a side-to-side anastomosis The wound closed without drainage

This woman made a *very excellent* operative recovery *in spite* of the fact that her entire colon was packed with fecal masses Gradually with mild cathartics and oil injections from below begun some days after operation we got rid of the fecal masses impacted in the colon and under good anticonstipation treatment the patient went on to a complete recovery as far as her bowel disturbance was concerned

This is but one of several cases where we have had to restore the intestinal tract to normal after these operations of ileosig moidostomy have been done for constipation It seems to me that an analysis of Lane s work and Lane as you know is more than any one else responsible for the development of these opera tions for constipation and an analysis of the work done by men who have followed his suggestion show conclusively that these operations are associated with an unwarranted mortality and that the after history of a great majority of the cases shows not only no improvement but often distressing complications such as occurred *in this case* To me there *is* no longer any question but that these operations are *illogic and unwarranted* and have

no place whatever in modern scientific surgery. I feel very strongly on this point. Today, all over the United States, operations are being done on the colon for constipation and for symptoms which are supposed to be due to intestinal stasis, and for epilepsy, and for other conditions, operations which are not only of no value to the patient, but which carry a good deal of risk of immediate operative mortality and a much larger risk of permanent disability from adhesions and interference with the normal function of the intestinal tract. These operations are done often by men who are good technicians and enthusiastic surgeons, but certainly a careful scientific analysis of the facts must force one to the conclusion that they are surgically unwarranted. We should prevent the continuation of such work by the severe criticism and ridicule which such procedures deserve.
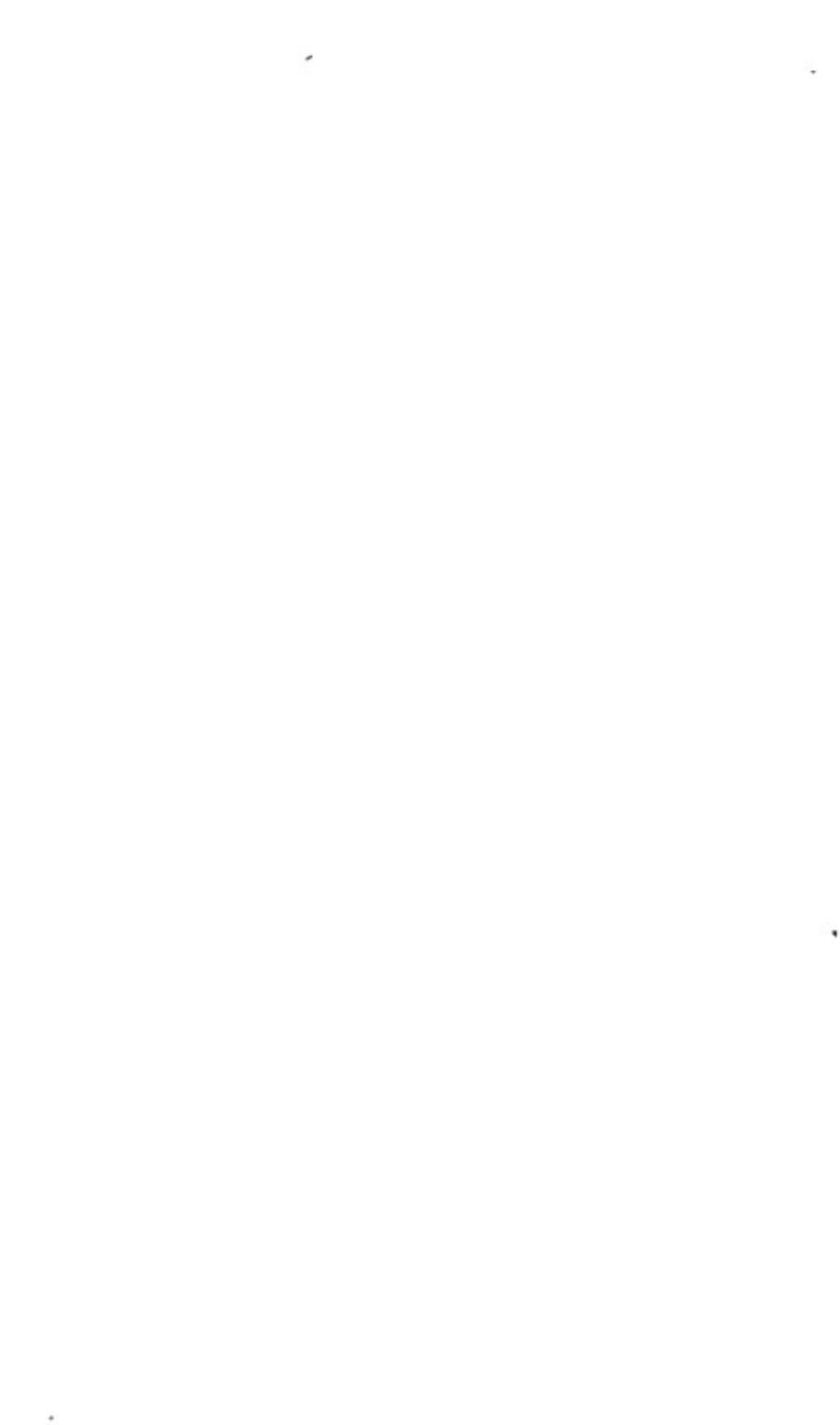
CLINIC OF DR E WYLLYS ANDREWS

MERCY HOSPITAL

DIVIDED BLOOD-VESSELS AS AIDS TO ACCURATE WOUND CLOSURE

Summary Importance of accurate adjustment of tissues for rap d clean wound healing faulty apposition and faulty repair in the deep layers of the skin and below the skin a cause of broad scars paired ends of divided vessels the best guides to proper alignment

VISITORS often ask why we tie our arteries in pairs across the wound edges in this clinic I will explain this surgical wrinkle in detail It is of more theoretic than practical importance possibly, but we see good in it and use it every day

You may have noticed that we tie together or reunite the stumps of all our divided veins and arteries across the wound instead of using separate ligatures on each side When a cut is made through the skin and other layers the bleeding points appear in pairs, each cut vessel having a corresponding cut vessel on the other flap exactly opposite Of course, these are tied off separately, and the stumps never fall together exactly end to end or knot to knot, as wound closure is usually done, hence the tree like or arborescent arrangement of blood vessels is interrupted and a map of their distribution would show a displacement of the trunk from its branches It is the purpose of collateral circulation to make up this defect by numerous compensatory branches, and this it does amply and easily in most cases The work put upon the tissues to accomplish this must be less the nearer the ligated ends are brought together, because the collateral circuits are made shorter If the cut ends could be united lumen to lumen no collateral vessels would have to be developed but they can only be united after being occluded Hence all we can expect is to shorten the collateral distance around these occluded ends

Whether it be a joint or other cavity that be opened, or the skull and meninges, or merely the depths of the soft parts, we seek to close up such lesions completely from within outward by sewing muscle to muscle, fascia to fascia, fat to fat, skin to skin, or it may be bone to bone, tendon to tendon, nerve to nerve, and even vessel to vessel. Perhaps the surgeon of the future will even search out the lymph-channels' and reconstruct their courses in closing wounds.

Are such ideas impractical and useless? No. The more the care and nicety in adjusting the wound layers, the better our repair; but all this accurate adjustment of wound layers works only in one dimension—the vertical. Why not work in three dimensions? There are two other directions in which wound edges are often deformed or displaced by false suturing— the longitudinal and the transverse. If the elastic skin had permanent transverse marks to guide us, we would find that many wounds after closure were drawn considerably out of line lengthwise or bent or drawn laterally from the original straight or curved line to some other form. That such results in practice may cause no harm we may admit and still claim some advantage for more accurate methods. Our knowledge of tissue repair does not tell us why scars differ so much after complete repair. Some scars are linear and almost invisible as time goes on. Others, apparently as favorable at first, widen out and have broad atrophic ribbons or large weals or welts. We are likely to find the cause of all this in what is out of sight, the faulty repair below the skin or in deep layers of the skin itself. The coarsely sewn skin with gaping spaces beneath may look fair and smooth when first sutured, but will yield the broad, conspicuous scar line. The same incision, with its subcutaneous muscles and fat firmly sewn and its edges everted with *agraffes*, or skin-clips, will yield a scar almost invisibly fine after a year or more.

We know no limit to the perfection of healing which follows minutely accurate closure. To illustrate this, I have several times had to regraft torn off pieces of tissue—usually skin, as a bit of the finger, or, in one case, the tip of the nose. If clean,
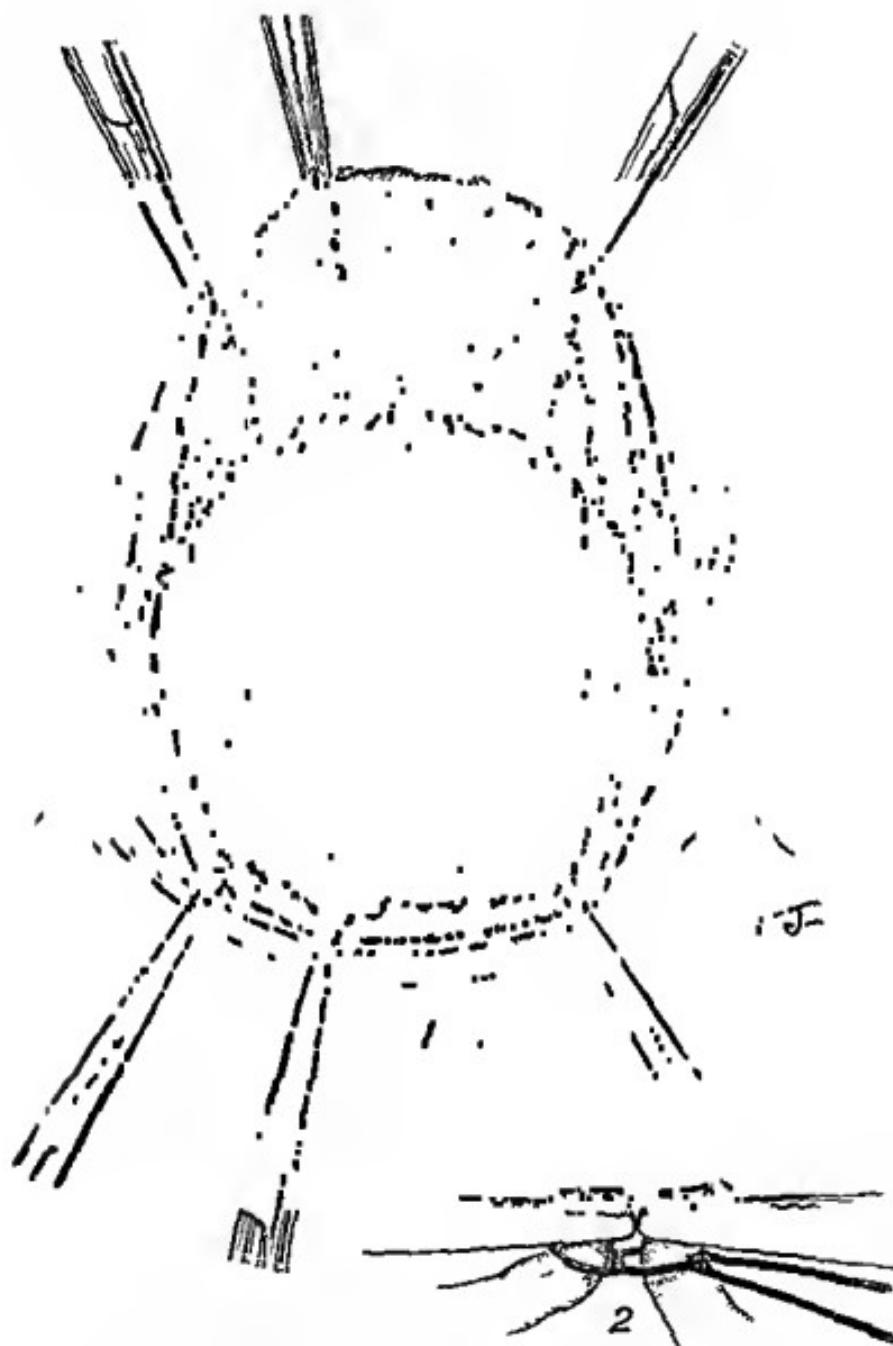
Fig 115—Divided blood-vessels **1.** Kocher incision Usual distribution of superficial vessels **2.** Detail of figure-of 8 connecting ligature

these fit with an accuracy which no new graft can approach. Such pieces carefully fitted to their old bed commonly unite so
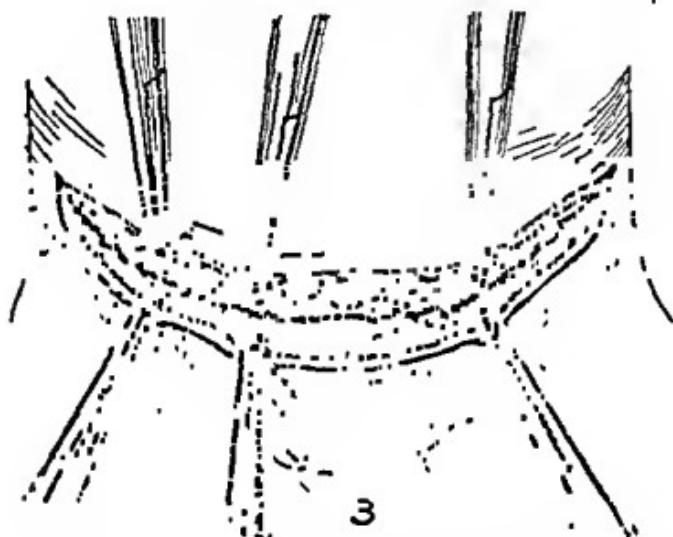
Fig. 115a.—Divided blood-vessels: 3, Drawing cut ends of vessels toward each other.

smoothly as to make the line of union nearly invisible. No graft from another part or another patient ever forms such perfect implants.

It is worth while inquiring whether in any wound minute care of adjustment might not show equal benefit. It may be that all cells grow better when placed against their absolute fellows and that all degrees of displacement do harm. Just as an autoplastic transplant grows better than a heteroplastic, so a cut cell may grow better to that from which it was cut than to those only a few centimeters distant. Admitting this, we should find that longitudinal displacement was an injury for vital as well as mechanical reasons. Displacing wound edges longitudinally ever so little changes the relations of nerve filaments and capillary branches enough to put new work on the organism and hinder repair.

Of all means of identifying the exact longitudinal position of wound edges, a study of cut vessels is the surest. The tissues have their ramifying vessels like branches of a tree radiating to central trunks. In outline they resemble the branching of rivers on a map. They furnish fixed points when divided which, like the surveyor's stations on a map, enable us to orient every-

thing else in the field This is no more true of blood vessels than
of radiating nerve filaments, but vessels are large and must be
caught up When seized and held by forceps they are seen to
lie in pairs, each vessel end having its fellow in the opposing
flap Let us take as a practical instance a hernia incision above
Poupart s ligament This divides at a stroke three or more
vessels, making about six bleeding points to be seized with
hemostatic forceps When these points are ligated separately
and the wound closed it will be accident that determines whether
the opposite cut ends fall near together or several centimeters
apart The soft distensible skin usually stretches so unequally
that we never know how much it is deformed I have some-
times practised marking the skin transversely with cross scratches
at regular intervals before making the incision, to furnish an
accurate guide in placing the stitches of a suture line When
this guide is used it is surprising to note how it exposes the
inaccuracy of our ordinary stitch spacing It shows us that a
longitudinal error equal to the distance of one or two stitches is
rather the rule without this guide

If, however, we use the arborescent vessels just below the
skin as a guide, and restore the arbor or tree like form by con
necting each cut branch to its fellow, a perfect wound adjust
ment is secured automatically This is true in all three dimen
sions—the length breadth and depth of a wound—for the vessels
lie in different planes like other structures

To illustrate this method in another location let us describe
an ordinary goiter operation Here the large vessels run verti
cally or obliquely so as to cross the transverse collar incision in
several places as in Fig 115, these cut vessels furnish a perfect
guide if their opposing stumps are tied each to its fellow thus
preventing any dragging or pulling from inaccurate skin union

In closing deep cuts in the mesentery such as made in bowel
resection it is found that vessel ends are a guide and help in
accurate adjustment The same is true of almost all incisions
which are to be reunited with stitches There is hardly an
incision known to surgery in which this tendency to show bleed
ing points in pairs is not seen and in which this principle of using
them for suture guides is not applicable

CLINIC OF DR. ALBERT E. HALSTEAD

St. Luke's Hospital

THREE CASES ILLUSTRATING POINTS IN THE SURGICAL PATHOLOGY OF THE REGION OF THE EMBRYONIC BRANCHIAL CLEFTS

Summary: Ranula—origin, diagnosis and treatment; technic of the operative cure.

Cyst of the Ductus Thyroglossus—an embryonic remnant; how thyroglossal fistulæ develop after birth; differential diagnosis from dermoids, sebaceous and branchial cysts; treatment.

Retromaxillary Tumor Probably of Branchial Origin—differential diagnosis of tumors of the superior carotid triangle.

CASE I.—RANULA

R. H., aged seven. On admission complained of recurrent sore throat with difficulty in breathing, and at times in swallowing. This is due to a growth underneath the tongue.

About two months ago he began to complain of his throat. His mother looked into his mouth and discovered a growth under the tongue. He has had all the diseases of childhood—measles, whooping-cough, chicken-pox, and scarlet fever.

Examination shows a well-nourished child of seven. Some difficulty in breathing, which does not seem to be due to the moderately enlarged tonsils and adenoids. In the floor of the mouth, occupying the entire sublingual space, there presents a tumor, soft, fluctuating on pressure, and painless. It is of a blue or violet color. There is no pulsation and no diminution in size under pressure. It is somewhat larger than an English walnut. Physical examination of the child is otherwise negative, with the exception of a slight systolic murmur heard at the base of the heart.

Comments.—The term "ranula" has been used since the days of Hippocrates to define tumors of various origin that occupy

the sublingual space Earlier writers, including Hippocrates
and Celsus, considered these tumors inflammatory, and many
curious theories as to their origin were advanced I need men
tion only that of Paré, who believed them to be the result of
a "descensus of pituitary matter from the brain" Later, when
the salivary glands were better understood, a closer study of
them led Jourdin to attribute ranula to a closure of the ducts
of the sublingual glands This was the nearest approach to
the true explanation of ranula that had been made up to that
time This view that ranula resulted from the closure of these
ducts with a dilatation of the glands behind the obstruction,
particularly the ducts of Bartholin or from the same process in
Wharton's ducts has been generally held from the sixteenth
century to the present time No doubt in some cases, ranula is
due to this cause, yet in many cases the tumor bears no relation
etiologically to the salivary gland Of 50 cases from the clinic of
Sonneberg, of Berlin only two were due to an obstruction of the
ducts of the submaxillary glands In one of these the obstruc
tion was from a foreign body It has also been observed that the
congenital atresia of Wharton's duct gives rise to cystic tumors
that present on the under surface of the tongue on each side of
the frenum Such a case was operated on by me about fourteen
years ago

Aside from the tumors that have resulted from a more or less
complete closure of the ducts of the salivary glands mentioned
we have ranula that are due to a cystic dilatation of the glands
of Blandin and Nuhn These structures are mucous glands
occupying the median portion of the tongue near the apex
They are commonly bilateral but sometimes only one is found,
occasionally extending backward and upward, reaching the base
of the tongue They may also be deep seated lying between
the genioglossus and hyoglossus muscles If these glands are
superficial and anterior the ranula will be superficial that is,
above the duct of Wharton If they are deep-seated the tumor
developing from them will be behind the duct and deep in the
floor of the mouth It was Recklinghausen who first described
ranula originating from these glands His first observation was

made at an autopsy. He was, therefore, able to make a close anatomic study of the condition as he found it. His conclusion was that the cyst consists of enormously dilated portions of the main intraglandular ducts, and to a secondary glandular hypertrophy accompanied by dilatation of the intraglandular portion of the duct, and a marked inflammatory process within the gland, called by von Recklinghausen "myxangoitis," which in time augments the size of the tumor and plays a considerable rôle in establishing the character of the growth. Sonneberg reported a case similar to that of von Recklinghausen occurring in a child of ten years. In this the tongue was nearly destroyed, the central portion being occupied by large cysts containing mucus and pus.

From the remains of the median portion of tractus thyroglossus—that is, from the tubule or duct of Bochdalek—there develops epithelial cysts that are also classed as ranulæ. These may develop in that portion of the median anlage of the thyroid that is represented by branching ducts or blind pouches lined with columnar epithelium. They may develop between the fibers of the geniobyoglossus and extend from the foramen cecum to the hyoid bone. These cysts growing downward may destroy portions of the tongue, particularly the posterior aspect, terminate in tumors of considerable size which fill the floor the mouth, or, if the development starts in the lower p᠎ the tract, they may grow upward into the floor of the displacing the tongue upward, with the ducts of the ᠎ lary glands lying above and posterior. If the wall of is examined before the character of the epithelium is by the pressure atrophy they may be recognized by the ᠎ epithelium that lines the cyst wall. The contents is ᠎ found to be reddish, serous, or mucoid fluid with ᠎ ᠎ epithelium. Infection may occur which gives the mucopurulent character.

Accessory sublingual thyroids undergoing cystic ᠎ tion have been reported as ranulæ. These can be ᠎ only by the appearance macroscopically and ᠎ after removal. They generally originate just above ᠎

bone and grow upward between the geniohyoglossi muscles into
the sublingual space   Their contents are generally a clear
mucoid fluid or a slightly yellowish gelatinous substance   From
what has been said it is evident that the term 'ranula' is a
clinical one covering many growths of various origins that may
be found on the floor of the mouth and that it does not designate
a distinct pathologic entity

To recapitulate ranulæ may be

1 Cysts due to the obstruction and subsequent dilatation of
    (a) Ducts of Rivinius
    (b) Ducts of Bartholin
    (c) Wharton s duct

2 Cystic growths arising from the glands of Blaudin and
Nuhn

3 Cystic epithelial growths arising from the tractus thyro-
glossus generally from the median portion

4 Cystic accessory thyroids developing above the hyoid
bone and growing into the sublingual space

The symptoms of ranulæ vary with the size of the growth
The small ones may not attract any attention and may be dis-
covered only by accident   As the cyst grows larger the pressure
on the lingual nerves may cause pain   In some cases reported
the growth rested on both the lingual and hypoglossal nerves
the pressure on the latter causing a paralysis of the lateral half of
the tongue   Difficulty in speech develops as the growth increases
in size   The hoarse and stridulous character of the voice noted
in some cases has been likened to the croaking of a frog   This
character of the voice is said to have given the name ranula"
to the growth causing the defect   If the tumor grows to any
considerable size and the patient is young in time an atrophy
of the mandible with a deformity of the teeth occurs   These
were present in a case recorded by Sonneberg

Treatment —The only method of treatment that we need to
consider is extirpation   Other procedures that have been ad
vocated are   First puncture with evacuation of the contents,
second puncture followed by the injection of irritating chemicals
with a view to causing an obstruction of the sac, third incision

and evacuation of contents   As the cysts are frequently multi
locular and the contents often thick and viscid any of these
procedures is likely to fail in effecting a cure   Extirpation offers
the only assurance of permanent cure   In one case treated by
me puncture made by a needle and the use of a bistoury had been
tried many times with recurrence after each attempt   Extir
pation as in the other case I have treated was successful in
effecting a permanent cure   In the majority of cases these
cysts can be removed through the mouth   In a few particu
larly those cysts that are from the tractus thyroglossus and
aberrant thyroids removal may be best made through a sub
maxillary incision   Either a lateral or median incision may be
employed

Operation —The first step in the operation is to introduce
a suitable gag to hold the jaws apart   The Whitehead gag is
the one we employ   The second step is to pass a linen suture
through the tongue so that it may be pulled forward and up
ward   You will now see exposed a bluish mass that completely
fills the sublingual space and displaces the tongue upward toward
the roof of the mouth (Fig 116)   This mass as you can see
is soft and fluctuating and projects slightly beyond the lower
incisor teeth when the tongue is pulled forward   Palpation
with one finger in the mouth and the other hand below the jaw
shows that it occupies the entire floor of the mouth extending
backward as far as the hyoid bone   An incision is made through
the mucous membrane on the under surface of the tongue and
the cyst is carefully separated from the tongue by sharp dis
section care being used to avoid injuring the lingual artery   We
are careful not to rupture the cyst   After separation from the
tongue the under surface of the cyst is separated from the
underlying structures in the floor of the mouth by dull dissec
tion   We now see that it occupies the space between the genio
hyoglossi muscles   these muscles being separated we see the
tumor resting on the geniohyoid muscle deep in the floor of
the mouth   In making the dissection just before the last
attachment of cyst has been separated the cavity is carefully
inspected to see that no portion of the cyst wall is left be

hind   The cyst is removed by continuing the sharp dissection
backward

Upon removal of the cyst and incising the wall we see it
contains a thick gelatinous substance of a yellowish green color
You will also note that the empty sac which I present for your
inspection has a very thin and almost transparent wall   From
the location of the cyst and the appearance of the cyst wall I
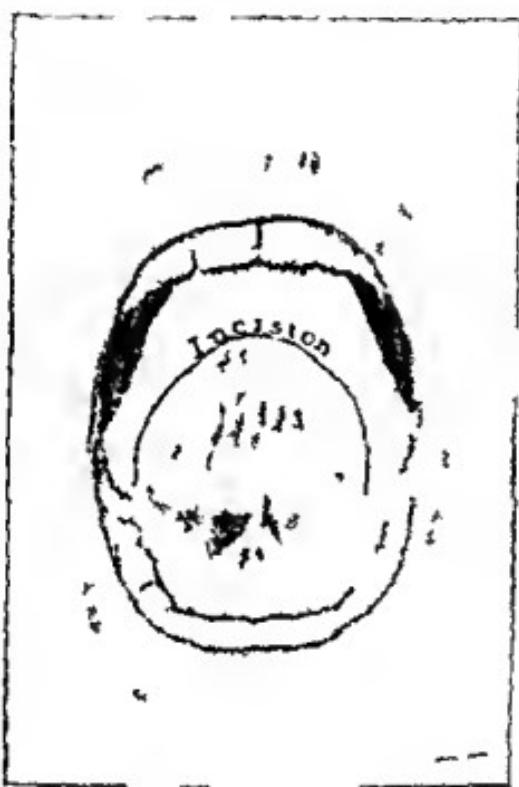
Fig 116 — Ranula   Note shape of incision

would venture to say that this is derived from the dilated intra
glandular ducts of the sublingual gland   On careful inspection
of the cavity beneath the tongue after the removal of the cyst
we find no evidences of remaining sublingual glands   After dis
infection of the cavity with a weak iodin solution the deeper
parts are closed by catgut suture   The cut edge of the mucous
membrane along the lateral margins of the tongue is united by
suture to the cut edge of the mucous membrane in the floor of

the mouth The smaller opening is allowed to remain underneath the lateral margin of the tongue, through which a gauze

Fig 117 —Incision closed, gauze drain in place The tongue is held out during the operation by means of the suture as indicated

drain is inserted to the deeper parts of the wound (Fig 117).
The silk suture is now removed from the tongue

CASE II.—CYST OF THE DUCTUS THYROGLOSSUS

P., male, age forty-nine, enters the hospital complaining of a periodic discharge from a sinus at the root of the neck The patient says that the sinus has existed since birth, and that his mother has told him that during infancy she often noticed that the milk taken into the mouth would flow from the sinus in the lower part of the neck. During early childhood this sinus closed and remained closed for several years About twenty-five years ago, when the patient was twenty-four years of age, the sinus reopened and has remained open since that time.

Examination shows a small fistulous opening $\frac{1}{16}$ inch in diameter on the right anterior aspect of the neck located $\frac{1}{2}$ inch above and $\frac{1}{4}$ inch to the right of the right sternoclavicular joint There is no pain or discomfort except that due to a slight irritation of the skin about the mouth of the fistula from the discharge and the discomfort incident to the retaining of a dressing to prevent soiling of the linen The discharge has been continuous for about three years Previous to this the sinus would remain dry for periods varying from three to six months The discharge previous to three years ago was thin and seropurulent in character and odorless Of late it is thick creamy and purulent in character and at times has an offensive odor

The patient s personal and family history are negative He has one brother and one sister both living and well Neither have any congenital malformations He has had the usual diseases of childhood His venereal history is negative

Further examination shows a well nourished and healthy appearing man The chest abdomen and extremities are negative No defects noted other than the presence of a fistulous opening on the neck above described From this fistula there is now discharging a thick yellow puriform fluid This discharge has caused a slight redness of the skin about the fistula opening The fistula readily admits an ordinary silver probe for a distance of about $1\frac{3}{4}$ inches and the direction seems to be toward the median line Bacteriologic examination of the purulent fluid shows nothing characteristic The yellow staphylococcus seems to predominate although other common forms of pus organisms are present in abundance The fistulous tract was injected with anilin dye solution This promptly appeared in the mouth discharging from a small orifice on the floor of the mouth underneath the lateral border of the tongue about $\frac{3}{4}$ inch posterior to the *incisor tooth* *Subsequently* the fistula was again injected with bismuth paste This also appeared in the mouth Stereoscopic radiograms taken after the injection of the bismuth showed the course of the fistula to be along the inner border of the sternomastoid for about $1\frac{1}{2}$ inches It then in

clined toward the median line, and above dipped deeper into the neck, passing under the body of the hyoid bone and upward in the floor of the mouth. The portion immediately behind the body of the hyoid bone was expanded into a sac-like dilatation (Fig. 118).

From the location and extent of the fistulous tract it is evident we have to do with one of the median cervical fistulæ of embryonal origin, probably having its origin in the remains
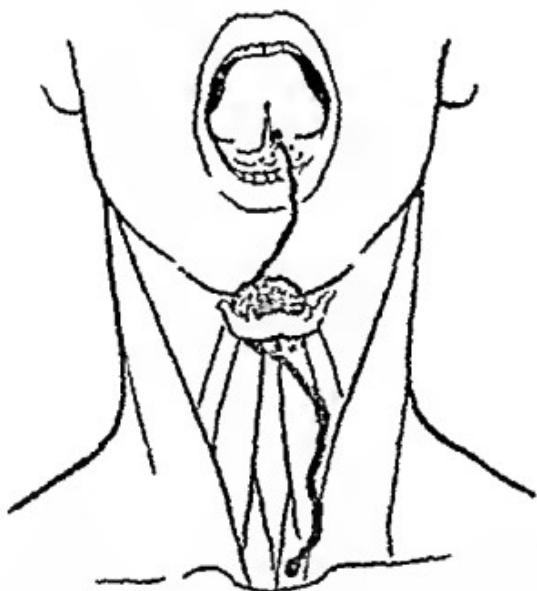
Fig 118.—Thyroglossal fistula. Sketch made from röntgenograms showing the course of the fistulous tract, and its openings in the suprasternal notch and in the floor of the mouth

of the tractus thyroglossus, the old connecting link between the foramen cecum of the tongue and the isthmus of the thyroid gland. These cysts and fistulæ of the ductus thyroglossus are situated in the median line, usually in relation to the body of the hyoid bone or upper border of the thyroid gland. They are present at birth or make their appearance shortly after birth, or may appear at any subsequent time. They are usually slow of development, but show marked variations in this respect. They are painless, soft swellings. When infection

occurs they may take on the characteristics of infected glands
or abscesses They are then generally painful and as the tension
from augmentation of the contents increases they may rupture
with the formation of a discharging fistulous tract when the infec
tion subsides and the discharge changes from a puriform to a mu
cous material   In the uninfected cysts and sinuses the discharge
is slight   Recurrent infections are likely to continue increasing
the discharge and changing its character from time to time   If
the primary infection is acute or if the infection passes through
the cyst wall an abscess may develop that burrows along the
fascial planes of the neck and may break through the skin at
most any point between the sternomastoid muscles either in the
*median line or as in this case close to the sternal attachment
of the muscle*

In this case we have to deal with a primary thyroglossal cyst
situated above and posterior to the body of the hyoid bone as
you can see from the radiograph   It has probably become in
fected in early infancy the infected contents of the cyst undoubt
edly burrowing downward behind the sternohyoid muscle and
finding its exit near the attachment of this muscle to the upper
border of the sternum   In making a diagnosis of thyroglossal
cyst we must consider the growths that may appear in this part
of the neck

First Sequestration dermoids occur here as in the other parts
of the middle line of the body   These are recognized by the
character of the contents it being identical with the dermoids
of other regions

Second Atheromatous cysts or sebaceous cysts   These are
in the skin and are never found deeply situated above the hyoid
bone as are the cysts arising from the tractus thyroglossus

Third Branchial cysts   These are found in the regions cor
responding to the location of the ductus branchialis and ductus
precervicalis of the embryo   These would therefore be found
along the anterior border of the sternomastoid generally behind
the angle of the jaw   The character of the epithelium lining the
cyst wall when examined microscopically will allow us to distin
guish between the cysts of the ductus thyroglossus and those of

branchial origin. In branchial cysts the squamous epithelium predominates, while in cysts of the tractus thyroglossus we often find columnar or ciliated epithelium. In a branchial cyst wall there are often found masses of lymphoid tissue or small cartilaginous nodules or groups of cartilage cells. These are not found in the cysts arising from the thyroid duct. In the cysts of ductus thyroglossus particles of thyroid tissue may be found in the cyst wall underneath the epithelial lining. Colloid material may also be present which will show the thyroid origin of the growth. In regard to the character of the epithelium it is important to remember that suppuration or prolonged pressure from a distended cyst cavity may alter the epithelium or destroy it completely, so that no diagnostic evidence can be obtained from the examination of one of these old cysts.

Operation.—A transverse incision is made across the neck similar to the collar incision of a thyroidectomy. This extends through the skin and fascia and platysma muscle. A flap of these structures is turned upward, the dissection being carried above the upper border of the hyoid bone. The fistulous tract is exposed lying upon the inner border of the sternomastoid for a short distance. We then see that it runs along the inner border of this muscle to within 1 inch of the hyoid bone, where we find it passes underneath the sternohyoid muscle. An incision of these muscles allows us to expose the tract up to the lower border of the hyoid bone. It passes beneath the hyoid bone, approaching at this point the median line of the neck. Here we find a dilatation of the tract forming a cyst 1½ inches in length and 1 inch in breadth, extending from the lower border of the hyoid bone backward and upward to the root of the tongue. Above the hyoid bone it rests between the hyoglossi muscles. After dissecting the cyst free, a short channel, ¼ inches in length, with a lumen that admits a small silver probe, is found to pass from the cyst to the floor of the mouth. This is dissected free. The opening through the mucous membrane in the mouth is closed by suture. The cavity occupied by the cyst is packed with gauze. The skin-flap is sutured back with silk. A drain is inserted deep into the wound.

CASE III—RETROMAXILLARY TUMOR PROBABLY OF BRANCHIAL ORIGIN

Mrs A American forty eight years old complains of a tumor on the left side of the neck back of the angle of the jaw The patient states that she has always noticed a small node under neath the angle of the jaw She has considered this to be a small gland Twelve years ago this node began to enlarge At the same time it became slightly painful to touch It grew within a year to the size of a filbert It remained stationary until two years ago Since then it has slowly increased in size until it has attained at the present time the size of an English walnut The patient s general condition is good no additional abnormalities of any kind

The physical examination is entirely negative except that she is hard of hearing On the left side of the neck about 2 cm below the angle of the jaw is a hard tumor about the size of an English walnut This tumor is slightly irregular upon its surface freely movable and painless and gives no sensation of fluctuation or pulsation on palpation

In considering the character and origin of this growth it is well to discuss briefly first the source of tumors common to this region (the superior carotid triangle)

A Growths connected with the lymphatic system
  (1) Inflammatory swellings of the lymph nodes
    (a) Acute
      Simple adenitis
      Suppurative lymphadenitis
    (b) Chronic
      Tuberculous disease of the glands
      Hodgkin's disease
  (2) New growths arising from the lymphatic system
    (a) Simple lymphoma
    (b) Lymphosarcoma
    (c) Secondary carcinoma
  (3) Cysts originating within the lymphatic vessels—
    lymphangioma cysticum

B. Growths arising from remains of the branchial system:

    (a) Solid branchial epithelial tumors and cysts.

    (b) Mixed tumors of branchial origin.

    (c) Branchial carcinoma.

C. Tumors of the carotid gland.

D. Tumors of the vascular system.

In differentiating tumors of this region (D) we must consider aneurysms of the external carotid and congenital blood-cysts. As this tumor is solid we need not take into consideration the cystic tumors of any of the above groups. An acute inflammatory process in the lymph-glands can be excluded upon the history of the slow growth and absence of inflammatory phenomena. Chronic inflammatory diseases of the lymphatics may be excluded on the basis that this growth is single. While it is possible to have but one gland that is palpably enlarged, yet we find upon careful examination in chronic inflammatory processes that the disease involves a group or chain of glands. This is true in syphilis and tuberculosis and also in Hodgkin's disease. The excellent physical condition of this patient will also go a long way in excluding both tuberculosis and Hodgkin's disease. Simple benign lymphoma is rather rare. The tumor is soft and painless and grows rapidly. Malignant lymphoma or sarcoma grows rapidly and quickly involves by extension the surrounding structures, and is associated with rapid deterioration of health and marked anemia. Secondary carcinoma can be excluded by the absence of any primary growth in the region affected. The multilocular cystic character of the tumor in lymphangioma cysticum permits us at once to rule out these growths. The same may be said of the congenital venous cysts originating from the deep veins of this region. Tumors of the carotid gland are rare growths developing from the carotid body, a glandular structure not of branchiogenetic origin, but belonging embryologically to the chromaffin system, being derived from the nerve anlage which pass from the upper cervical sympathetic ganglion. Tumors originating in this gland are at first of slow growth, resembling closely in their clinical appearance those of the branchial system. Later they generally take on a more rapid growth and present the characteristics of

malignancy They are situated at the bifurcation of the carotid
artery and are extremely vascular deriving their blood supply
from both the internal and external carotids and at times from
the common carotid This great vascularity frequently causes
that expansile pulsation which closely resembles the pulsation
of an aneurysm They are generally soft vascular appearing
growths and on cut section show a reddish gray or reddish brown
color They form metastases and like other malignant growths
have a great tendency to recur

The solid tumors or cysts of branchiogenetic origin generally
arise from the second cleft or furrow They are therefore found
in the region of the ductus branchialis and ductus precervicalis
which structures are present in the embryo and represent stages
of growth of the first and secondary branchial arches As the
branchial ducts and precervical sinus are but temporary struc
tures failure of complete retrogression permits groups of epithelial
cells or rests to remain buried in the neck From these epithelial
elements the solid tumors originate Other tissues such as car
tilage or bone may be derived from the arches (first and second)
which go to form the hyoid bone and the mandible The solid
tumors of this region are generally mixed tumors containing both
mesoblastic and hypoblastic elements The mixed tumors of
the parotid gland are of the same structure and origin Bran
chial carcinoma represents the malignant degeneration of the solid
or cystic epithelial tumors of the branchiogenetic origin They
are also termed deep carcinoma in contradistinction to the car
cinomata originating from the superficial epithelial structures
The clinical history of these tumors is that of a slow benign proc
ess at first Later they take on a rapid growth involving the
deeper structures of the neck and speedily bring about a fatal
issue

Operation —An incision 3 inches in length is made over
the tumor and along the anterior border of the sternomastoid
muscle The skin and fascia are separated exposing the superior
carotid triangle of the neck The tumor is found encapsulated
Its anterior aspect is in close union with the posterior belly of the
digastric muscle Its posterior surface is intimately connected

with the fascia enclosing the carotid vessels. It is removed by sharp dissection. The deeper parts of the wound are closed by catgut suture and the skin is sutured with horsehair and the usual dressing applied.

The tumor which has been removed is nearly spheric, measuring 1¼ inches across on the median section. Its cut surface is grayish red, with areas that glisten like cut cartilage. It is dense and firm and gives a grating sensation on section. We are, therefore, justified in assuming that it contains cartilage and that it is a mixed tumor, probably of branchiogenetic origin

LARYNGECTOMY UNDER NERVE BLOCKING

Summary A patient with extensive carcinoma of the larynx involving extra-laryngeal tissues, radical laryngectomy indicated, technic of nerve blocking for laryngectomy, its superiority over general anesthesia, the novocain calcium-magnesium solution

THE case which we wish to show this morning presents the following history, omitting unessential details: F. K., age forty-seven He has been feeling poorly for the past six months, during which time he has complained of a sore throat, cough, and difficulty in swallowing He has had a mucopurulent sputum, streaked with blood, which has become quite profuse of late For the past month he has been unable to swallow without great pain, and about three weeks ago he lost his voice, so that now he can speak only in a whisper. His appetite is poor and he has vomited after eating several times recently. He says he has lost about 60 pounds in weight His general appearance is bad, he is poorly nourished, shows a great loss of weight, and his muscles are flabby The important part of the physical examination, so far as we are now concerned, relates to the larynx This is found to be filled with a nodular ulcerated mass. The right vocal cord is entirely destroyed and the left one paralyzed The mass so fills the larynx as to cause a marked stenosis There are a few palpable, enlarged, hard lymph-glands on either side, particularly the left, in the upper anterior triangle of the neck

A diagnosis of advanced carcinoma is unmistakable, but not-withstanding the advanced stage of the disease and the poor general condition of the patient, the stenosis is so marked and the dyspnea so intense that an operation is imperative in order that he may have relief. A simple tracheotomy would give relief so far as the dyspnea is concerned, but we feel that the patient

should be given a chance at least for that greater relief which may come from a more radical operation and this too in spite of the fact that a few of the neighboring lymph glands are already involved   We are also led to the major rather than the minor operation for the further reason that a complete laryngectomy is but little more difficult than a proper tracheotomy   Exception may be taken to this last statement by many who have done laryngectomy by the older method with general anesthesia and we will agree perfectly with anyone that a complete laryngectomy done with all the annoyances difficulties and dangers of the usual general anesthesia is a very trying as well as a serious operation but under nerve blocking the operation is robbed of most of its difficulties and becomes quite simple

Under nerve blocking the operator is freed from the annoyances inevitably connected with the anesthetist and his apparatus the tracheotomy tube etc and can proceed with the operation with a perfectly free field   The nerve supply of the anterior region of the neck is well adapted to nerve blocking and almost all operations involving this region can be performed by this method with great satisfaction   To block this region the needle is inserted just behind the middle of the posterior border of the sternomastoid muscle   The external jugular vein usually crosses this muscle at about that point so that the needle usually enters just above and behind the point of crossing on the vein and the posterior border of the muscle but the vein varies somewhat at times so that it alone is not a reliable guide   The vein however should be identified before inserting the needle so as not to puncture it and thus inject the solution into the vein   The point of the needle should be just beneath the deep fascia in immediate proximity to the branches of the superficial cervical plexus   The needle being now inserted as shown in Fig 119 25 c c of the novocain calcium magnesium solution[1] are injected on either side

Solution used	
Novocain ½ per cent	3 parts
Calcium chlorid 2 per cent	1 part
Magnesium chlorid 2 per cent	½

Mixed at the time of using and to which about 6 drops of 1 1000 adrenalin solution are added just before using to 60 c c of the solution

Labels within figure:

X

X X

Ext jug v

1

2

Ext jugular vein

3

T. Jane
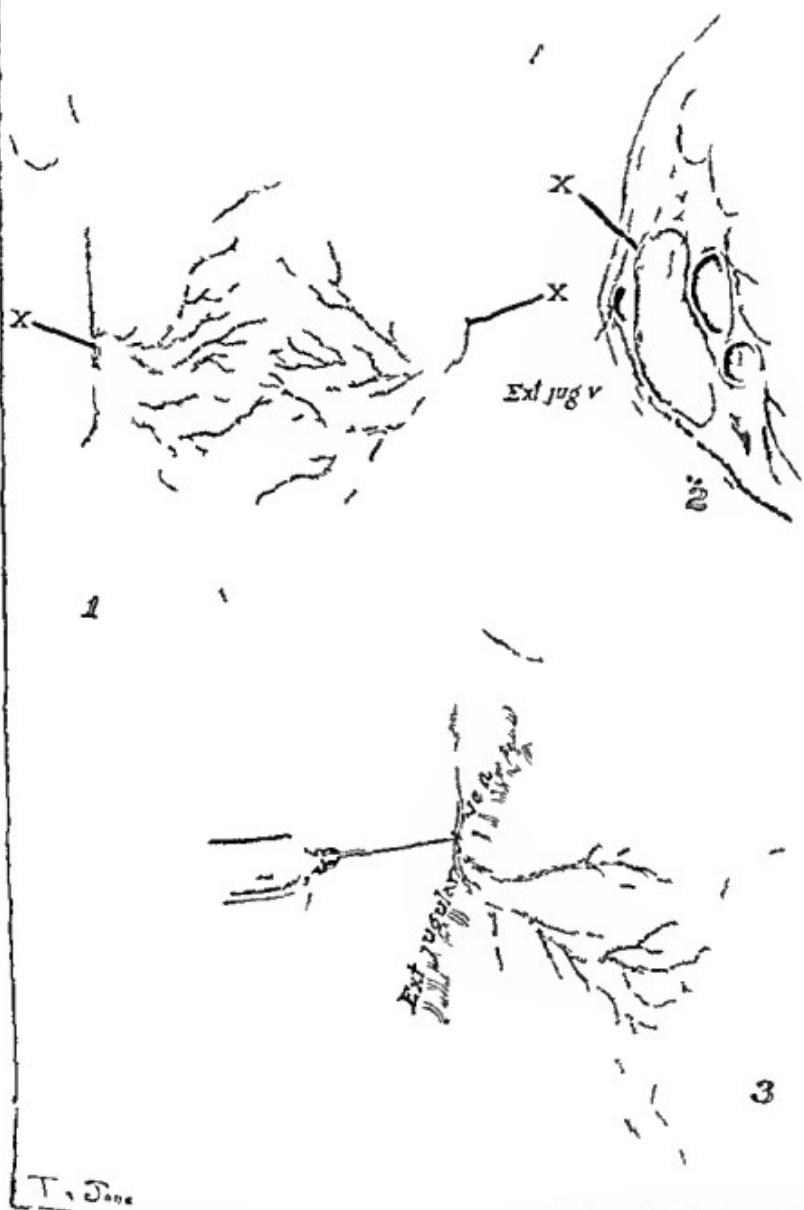
Fig 119 —1 and 3 sho v the d stribution of the nerve supply of the neck and the po nt at v h ch the needle is inserted for the injection of the anesthetic In 2 the position of the injecting needle and the immed ate anatomic relations are sho vn in cross section

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of the neck   10 c c of the same solution are next injected on
either side near the **outer end of the hyoid bone**   In less than
five minutes we have a complete anesthesia of the entire region
of the neck   An incision is made along the midline of the neck
from just above the hyoid bone to the suprasternal notch and
on account of the enlarged glands on the left side a transverse
incision is made near the **upper end** parallel with the hyoid bone
The longitudinal incision is carried down at once to the thyroid
cartilage above and to the trachea below exposing the isthmus
of the thyroid which is doubly ligated and divided and the lat
eral halves pushed aside   A loop of strong silk is passed around
one of the cartilaginous rings of the trachea the trachea com
pletely divided above that ring and the lower end of the trachea
drawn out at the lower angle of the wound   A few drops of the
novocain solution are now injected into the mucous membrane
of the proximal end of the trachea and you will notice that there
is no evidence of tracheal irritation no tendency to cough and
no change in the rate or character of the respirations after treat
ing the trachea in this manner   By means of the silk loop about
the ring of the trachea the end of the trachea can be easily drawn
forward out of the lower end of the wound so there is no inter
ference with respiration   The advantage of not being bothered
by the anesthetist at this point of the operation is very apparent
On account of the dissection of the **upper anterior triangle** of the
neck which we intend to make we turn down and out skin flaps
at the upper angle of the incision

We now proceed to dissect out the larynx completely includ
ing the tissues and lymph glands on either side above   On dis
secting posteriorly we reach the region of the esophagus and the
pharynx and up to now you will notice that the patient has
given no evidence whatsoever that he has suffered the slightest
pain but on cutting the wall of the pharynx he moves his hand
as an indication that it hurts   This we would expect as we
are now in a region not supplied by the cervical plexus but by
the glossopharyngeal nerve so we will now inject a few drops of
novocain solution along the wall of the pharynx so as to block
this region   In doing this we should be careful not to block the

pneumogastric nerves.   Having made this injection, we proceed
with the dissection, and the patient gives no further evidence of
pain.   The larynx is now completely removed, including the
epiglottis and the surrounding tissues.   Fortunately, we are able
to close off the pharynx in front, which we do with catgut.   A
drain is placed in the upper end of the wound and the skin closed
down through the lower angle, where we bring the proximal end
of the trachea to the surface and carefully suture it to the skin,
leaving the opening free without the introduction of a tracheal
tube.

The patient will be placed in bed and allowed to sit up at
once, and will be fed for a few days through a tube.

Anyone who has undertaken, or even witnessed, an operation
for the complete removal of the larynx under general anesthesia
cannot fail to be impressed by the ease and facility with which
the operation can be performed under nerve blocking.   As you
have seen, there has been no difficulty with respiration, no trouble
or annoyance with the anesthetic, and the patient's general con-
dition at the end of the operation shows that there has been
practically no shock.   His pulse was 90 before starting the oper-
ation, and it is only 100 now, the quality and fulness remaining
about the same.   It is quite evident from his actions during the
operation that he suffered no pain, and this, too, notwithstanding
the fact that he had no morphin, scopolamin, or other anodyne
before the operation, showing conclusively that the anesthesia
and freedom from pain were due entirely to the nerve blocking.

NOTE.—This patient recovered from the operation, gained
rapidly in weight and general health, and was very comfortable
for some months, when internal metastases began to show.

CLINIC OF DR. CARL BECK

North Chicago Hospital

PLASTIC OPERATIONS ON THE UPPER EXTREMITY

Summary Great functional value of the hand and arm—necessity of knowing how to preserve the usefulness of an extremity following an injury Disability due to cicatrix—treatment

Four illustrative cases

Case 1 —A man with marked contractures at the elbow, wrist, and about the thumb following severe burn, technic of the correction of the deformity and the restoration of function

Case 2 —Loss of thumb and first finger as the result of a crushing injury, repair of the large defect by means of pedunculated skin flap

Case 3 —Amputation of thumb for sarcoma, repair of defect, the first finger trained to assume the function of a thumb

Case 4 —Mobilization of an amputation stump which had been made useless by contracting scar tissue

THE function of the arm and hand for a laboring man is of the highest value The sacrifice of even the smallest part of it means a great loss, it may mean the loss of a livelihood Of course, a great deal depends upon the kind of work which the arm performs The arm of the street laborer with mutilated fingers may still be very useful, but if the same injury were to befall an artist who plays the piano or the violin, it would mean the absolute loss of a career or permanent invalidism It is, therefore, of the greatest importance for the surgeon to study the methods of conservation and restoration of the arm and hand to usefulness and function

During the past three years many thousands of individuals have been injured and maimed in the war to such an extent that apparently only useless stumps of their arms are left, but in many instances surgeons are succeeding in making these limbs useful by careful prosthesis and plastic operations It is, therefore, of the utmost importance to study this part of surgery as much as pos-

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sible, as there will be many hundreds of instances in which conditions can be improved if the surgeon knows how to go about it

The first important factor will be for the surgeon to prevent, if possible, the loss of the function by the greatest watchfulness during the treatment *after the injury* and during the remote after treatment He should endeavor to retain the activity of muscle, nerve and blood supply, and to prevent stiffening of joints, retraction and contracture of muscles, bad scar formation and atrophy of valuable muscles and tendons All these preventive features, of course, will be out of the question when the case comes to the surgeon with an accomplished deformity, and the only question which will arise then will be, What can be done to make this arm or hand useful? It will be interesting to study a few cases of plastic restoration of arms, hands, and fingers of which I shall show you a few examples

A little more than a year ago this man, John F, a foreman for the Commonwealth Edison Co, while working at a station grasped a 2000 volt free-end of a connection, and immediately his hand, arm, shoulder and the side of his chest were burned to a black crust He was brought to the hospital in a very shocked condition Fortunately for him, the current seemed to have invaded the tissues only to such an extent that the deeper structures, like tendon, muscle nerve, and blood vessel, were not destroyed except in very small places The skin, however, and the subcutaneous tissue and fat were burned

The immediate treatment consisted of such dressings of the wounds as were the least painful for him and the most promising for future repair Sloughing took place, as it usually does in such cases and gradually a large surface of the forearm the chest, and shoulder was transformed into granulations Convalescence was slow The arm was drawn toward the chest the elbow was flexed and the hand bent and stiff in extreme flexion For weeks he was dressed with salves and powders until the granulations were healthy enough to start skin grafting This however, was very unsatisfactory The grafts healed only on some places Figure 120 shows the extent of this injury when all these burned surfaces had been transformed into granulations

Skin-grafts from different individuals were used on different occasions, but the results, on the whole, have been unsatisfactory except in some places where no motion is required. These places are, for instance, on the outer surface of the arm over the deltoid Scar would be here just as good, so that the gain through the skin-graft was very small. The granulations gradually, in the course of about a year, contracted in the elbow and over the wrist. The circulation was not particularly good. If the patient held

Fig 120.—Mr T Condition after burnt surfaces of hand and chest sloughed off, showing the extent of granulations over the whole arm, forearm, chest, and side of the chest before any plastic was undertaken

the arm down the hand would appear very cyanotic The condition at this time is best shown in Figs 121, 122. These pictures, however, show that there is no contracture in the shoulder-joint, because we have been preventing this by manipulations and by keeping up the motion in that joint. Had we kept this shoulder quiet during the whole after-treatment, there would be a contracture from inactivity and a great deal of difficulty in later use of the shoulder. As it was, with all the contractures in the elbow,

Fig 121 —The same arm after repeated attempts at skin grafting There are granulations on the forearm still present The elbow especially above, is very much constricted through granulations and scars and the whole hand is flexed to its extreme by contraction of scar tissue

Fig 122 — All granulation tissue has disappeared and is replaced by scar, showing the extent of contraction—an absolutely useless arm in this condition before any plastic was undertaken

in the wrist, and in the thumb, as one of the pictures shows very clearly, we have good motion in the shoulder-joint. After the whole surface had been transformed into a good scar, a web of scar was formed between the upper and lower arm, producing marked contracture at the elbow and wrist. We began then to move the contracted joints, and we were able to satisfy ourselves that the contraction was due only to the external difficulty produced by the scar, and not through the stiffness of the

Fig 123 —The first flap was taken from the chest and attached to the freshened surface over the inner side of the elbow. Adhesive plaster was attached to the upper part of the arm to help maintain immobilization

joint or destruction of any muscles. We therefore began to plan a plastic by flap operation

The first flap operation is shown in Fig 123, which is the reproduction of a photograph taken during the operation. When we removed the scar of the elbow and stretched the arm to a perfect horizontal, we found that all the muscles and tendons were intact, but the skin was missing over an area 14 inches in length and about 3 inches in width. This required a very large

flap, and it had to be a flap including the whole thickness of the skin since a Thiersch graft would not allow any mobility of the joint

The mere presence of an epithelial graft produces more rapid formation of scar It seems to me that it acts like the adhesive plaster which is sometimes put on a granulating surface the only exception being that occasionally the skin graft is cut very thick and then of course, we really have not a skin graft, but a

Fig 124—Two weeks later the flap was cut free from the chest and the arm fully extended The oval defect on the chest shows the size of the flap which in reality is more elongated than is indicated by the shape of the defect

skin flap with underlying structures which is essentially a skin flap without a pedicle We decided to take a pedicled flap from the chest as the accompanying Fig 123 shows We sutured the flap so that there was no possibility of disturbance of circulation—i e with the free tongue of the flap toward the wrist—and we fastened the arm tightly to the chest so that it was immovable We also fastened the hand to the body with adhesive plaster It was a pleasure to see that this flap healed

in place to a large extent, and when we cut its pedicle about ten
days afterward (Fig 124) the large flap was held very correctly
over the elbow-joint   Only a little portion of it had sloughed,
but about 10 or 12 inches in length and fully 3 inches in width
was retained   The large defect on the chest was reduced by
drawing the edges together with silver wire and plate suture
(Fig 125)

The next step was to remove the contracture of the wrist.
This was more difficult, since the tendons at the wrist had been

Fig 125 —The chest defect has been coapted by three wire plate sutures and trans-
formed into a linear wound

deprived of their sheaths and were involved in the scar.   When
we started to operate on the wrist we found that the scar was very
dense, and when we removed it we had exposed the tendons of
the flexor muscles and had to remove some very large veins.
Fortunately, we did not strike any arteries in our dissection   A
good sized surface needed to be covered, and in Fig 126 we see
distinctly how this was done, the hand being sutured to a pedun-
culated flap over the hip.   Some difficulty was experienced with
the thumb, which had been adducted considerably, as shown in
Fig 121   This adduction made it rather hard to bring the flap

into close contact with the wounded surface, but after we had dissected the thumb away from the hand we were able to get the contact desired   The flap from the side of the hip healed in beautifully and after a few weeks we had the pleasure of demonstrating the condition shown in Fig 127   At this time the patient was able to move his arm, as shown in Figs 127 128 and 129, flexing and extending it, the only difficulty being that of having the thumb closely adherent   Some time later however we started to make also a plastic of the thumb in such a manner that we

Fig 126 —The flap for the wrist portion showing how it is attached to one side of the granulating wound and left in broad contact with the surface to be covered al o the adhesive plaster which kept the arm in position   This picture was taken just before removing the stitches and cutting the pedicle of the flap

interposed a flap between the thumb and the first finger and now after about a year the man has a total restoration of his function being able to use his arm for every part of his work almost as satisfactorily as before the injury

In the last case the hand itself was not injured to such an extent that a part of the same would be lost   We have had cases in which the hand and particularly the thumb part of the hand had been injured so that the remaining portion of the hand would be useless unless the injury could be repaired by some tissue that would prevent contracture and allow motion of the

Figs 127-129 —Illustrating the range of motion obtained by means of the plastic operations Note the small size of the scar on the abdomen

uninvolved portion Figures 130, 131, and 132 are illustrative of such cases In the first instance (Fig 130) the man sustained an injury which destroyed his thumb and forefinger There was a ragged and bleeding wound from which the metacarpal bones were sticking out A skin graft of this was impossible but by suturing flaps from the chest wall over the defect a very satisfactory covering was obtained (Fig 131)

Fig 130—The position of the arm and the flap which was taken to cover a portion of the hand still in contact with the chest wall

Fig 131—The flap attached to the hand on all sides and the chest defect produced Two incisions have been made one on each side of the wound, for the purpose of mobilizing the skin so that the main defect may be closed by linear suture

I have often been able in such cases to cause the first finger to assume the function of a thumb by gradually getting this finger opposed to the other fingers and so allowing the patient to have a grip Figure 132 shows a case of sarcoma of the hand which necessitated an amputation of the thumb That made it very awkward for the man who is a working man In order to

Fig 132 —The same type of operation as that shown in Fig 131   A pedicled flap from the chest is being used to cover a large surface left after removal of the thumb for sarcoma

Fig 133 —The stump of the child s arm after some of the stump has been covered by scar   Some granulations are still present

satisfactorily transform the first finger into a thumb I was obliged to make a plastic as shown in Fig 132, which is almost iden-

tical with the plastic in the case before, except that in this instance the first finger is retained, so that the man has four fingers instead of three. The first finger is then gradually trained so that it may be opposed to the others, and thus the man becomes able to grasp things with his hand.

Fig 134—Showing how, through the contraction of the granulations shown in Fig 133, the arm has been so hyperextended that the stump points backward. This is a perfectly useless stump, which would if an artificial arm were placed on it, make the arm point about forty degrees backward

Fig 135—The arm from the back The stump is also clearly visible pointing backward

An interesting plastic is one in which I restored the activity of a stump after amputation, and which allows this boy to use an artificial hand instead of an artificial arm. The history of this case is very interesting and the result shows a very satisfactory condition at the present time

This little boy was run over by a street car. He was taken

to a hospital, where a primary amputation was performed Very carefully the doctor retained everything that was possible, but, unfortunately, there was not enough skin to cover the stump of the forearm The amputation of the forearm was done in such a manner that about 3 to 4 inches of the radius and ulna were retained There was not enough skin present to cover the stump below the elbow On two different occasions I tried to skin-graft this surface, as it looked very healthy, but on both occasions

Fig 136 —The method which has been used to allow flexion, by breaking the elbow joint which is partly stiff, and attaching a flap with the pedicle to the chest

most of the skin-grafts sloughed off and would not heal There was too much suppuration Gradually, however, the scar drew the skin over the elbow joint and, some of the skin in front of the arm having been retained it covered the stump as is shown to some extent in Fig 133 By secondary skin grafts and adhesive plaster dressing we ultimately got a scar to cover the whole stump, with the result, however, that the arm was absolutely immovable at the elbow-joint and the stump was drawn backward in hyper-extension, as is shown in Figs 134 and 135 This made it very

awkward for the boy in using an artificial hand *He could not*

Fig 137 —The pedicle has been partly severed and the incision is about to be completed

Fig 138 —The end result *The flap healed in place and the patient rapidly acquired the normal range of motion*

flex the stump, and there appeared to be nothing to do except to cut off the arm somewhere above the elbow so as to give the boy

a better stump for an artificial arm. I decided, however, to make every possible effort to save the stump and mobilize the elbow-joint, because if this could be accomplished the range of usefulness of an artificial hand would be greatly increased. The way I did this is shown in Figs. 136 and 137. A pedicled flap was taken from the chest. The ankylosis at the joint was broken forcibly under anesthesia, the stump flexed, and the skin defect which existed here was dissected clear down to the muscles and then covered in the manner indicated. I sutured the arm to the chest, and to prevent the boy from tearing it off also bound arm and chest with adhesive plaster.

The result was very good, as the picture (Fig. 138) shows. The flap healed in and was later separated from the chest, and now the boy has complete mobility of his forearm, so that all he misses is his hand, which, of course, is a great advantage over a stump stiff at the elbow, and over a stump such as would result from amputation above the elbow-joint.

These three cases are illustrative of a method of plastic repair of defects by the use of large pedicled flaps from the chest, breast, and side of the body, which has a great field of usefulness and should be familiar to every surgeon.

BULLET LOCATED BETWEEN THE ATLAS AND THE BASE OF THE SKULL· TECHNIC OF REMOVAL THROUGH THE MOUTH

Summary Indications for the removal of foreign bodies from the tissues case his
tory, operation indicated because of the severe pain method of exposing the
vault of the pharynx the bullet located at operation by means of the fluoro-
scope uneventful recovery

THE case here presented is of especial interest because of the symptoms presented through the unusual location of the bullet, and second, because of the technic used in its removal The removal of a bullet or foreign body is, of course, not necessary unless it impairs the function of the individual or jeopardizes his life In the present case operation was delayed for nearly two months in the hope that after the primary irritation had subsided it would cease to give signs, but this hope was not justi fied and its removal became imperative

It was approached with some timidity because of the complex relation of the structures in juxtaposition to the bullet, since it was feared that not alone would it be difficult to remove, but that a meningeal infection might ensue and jeopardize the life of the patient

CASE REPORT

G M , aged eleven years, referred by Dr J S Cunningham, of Gibson City, Illinois The patient was shot eight weeks before the date of the operation by a 22 caliber bullet The bullet entered to the left of the median line on a level with the cricoid cartilage, and passed upward and to the right and lodged between the atlas and the base of the skull, lying upon the dura The bullet, as shown at operation, had grooved the atlas in its

course (Fig. 139). No vital structures were injured in the passage of the bullet.

After the primary inflammation had subsided the patient complained of constant dull pain in the right side of the neck, below the mandible. This was so severe as to disturb his sleep and to give him constant pain when awake. He made the further complaint that movements of the head laterally did not give much pain, but that movements anteroposteriorly caused such severe pain that he was unable to execute them. His physical

Fig 139—Location of the bullet between the atlas and the base of the skull
Note the groove on the atlas. The arrow indicates the course of the bullet

condition was excellent. There was no evidence of any other complicating condition.

He was watched for eight weeks in the hope that the irritation would subside, but, on the contrary, it seemed rather to grow worse, and it was deemed necessary to make an attempt to remove the bullet. Both lateral and anteroposterior x-ray pictures and stereoscopic pictures were taken that located the bullet accurately about $\frac{1}{2}$ inch to the right of the median line on the anterior surface of the dura, between the atlas and the base of the skull.

The only absolutely clear picture that was procured was an antero-posterior picture with the head thrown back and the mouth widely open.
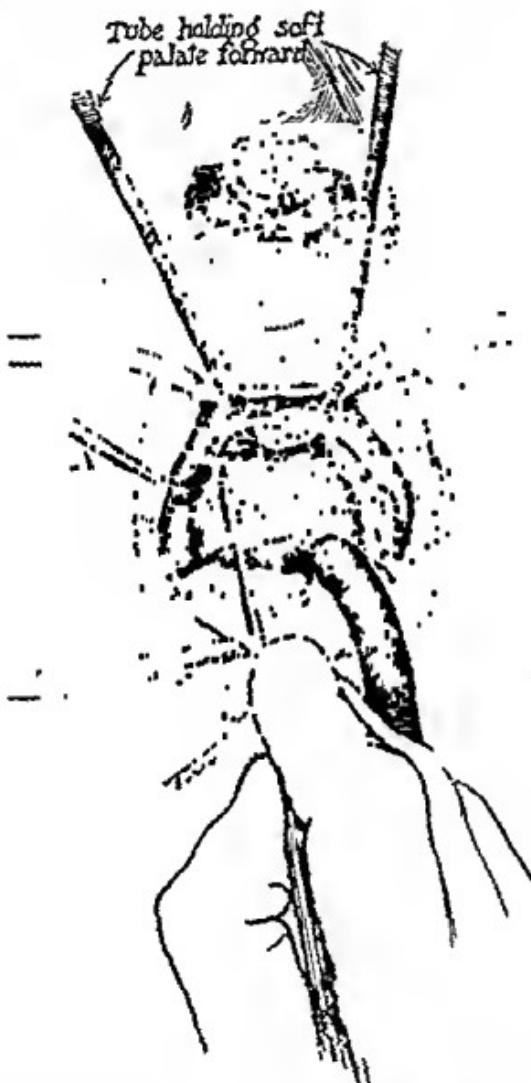

Fig. 140.—Technic of removal Tube inserted in nose with gauze, which protected the septum from pressure, the posterior pillar on the right side being hooked up and drawn forward.

It was recognized that it was impossible to remove the bullet by a lateral incision. The patient was, therefore, anesthetized

and the head thrown far back, and a rubber tube introduced through the nostrils, with the two ends brought out through the mouth, so that the soft palate was held up and away from the field, thus exposing the vault of the pharynx (Fig. 140). The anesthetic was given by the pharyngeal method.

An incision about 1 inch in length was then made to the right of the median line, just behind and parallel to the posterior pillar on the right side and on a line with the atlas. With a blunt dissector the muscular and connective tissues were separated down to the body of the bone, and the groove which had been cut by the bullet was identified, but the bullet could not be seen. A silver wire was, therefore, placed through the tissues at that site and passed deeply, and the patient taken to the fluoroscopic room, where it was evident that the wire was immediately over the bullet. He was then returned to the operating-room and further search made. It was then found that the bullet had formed a pocket behind the upper part of the atlas, so that sometimes it would lie between the atlas and the base of the skull and at other times it would lie in the pocket on the inside of the atlas (Fig. 141). The bullet was found at a depth of at least 3½ cm. from the mucous membrane surface. It was then removed and the wound painted with tincture of iodin, and a small strip of gauze was packed into the wound, no suturing being done

The patient made an uneventful recovery, with the exception that his temperature ran up as high as 102° F. on the third day and his nose and face were somewhat swollen, due probably as much to traumatism as to infection, since there was no evidence of severe inflammation. This immediatley subsided. The gauze was removed at the end of twenty-four hours. The patient left the hospital at the end of ten days. He could at that time flex and extend the head without pain, an action which had previously been impossible. A late letter from him states that he has no evidence whatever of the previous injury.

The removal of the bullet from this position and by this route, while unique and seemingly rather difficult, really presented no

Tube holding soft palate forward

Tenaculum retracting post. pillar

Trachea

Tr. Cart.
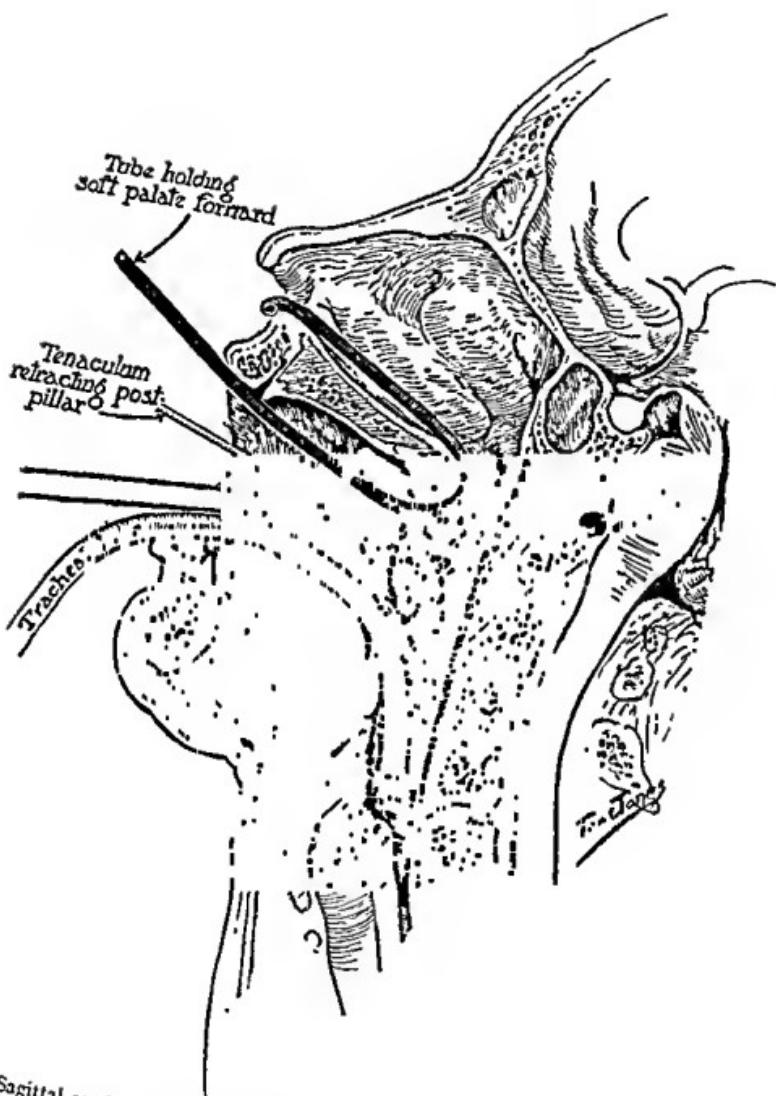
Fig. 141.—Sagittal section of the vertebral column showing the position of the bullet.

great technical difficulties It was somewhat tedious, but there was no hemorrhage and no vital structures were met with Aside from the possibility of meningitis, rather remote it would seem, the method is without danger, and can be recommended for the removal of such foreign bodies in this portion of the pharynx over the first four cervical vertebræ The possibility of infection of the wound is, of course, present, but with adequate drainage probably need not be feared

CLINIC OF DR. D. N. EISENDRATH

Michael Reese Hospital

INGUINOSUPERFICIAL HERNIA ASSOCIATED WITH NON-DESCENT OF THE TESTIS

Summary: A patient seventeen years of age with a soft, spheric mass in the left inguinal region, and but one testicle, the right, in the scrotum; undescended testis—indications for operation; non-descent and abnormal descent; interstitial herniæ—types; technic of operative procedure in present case.

THE history of this case presents nothing unusual. The patient is a boy of seventeen who was examined by a physician for one of the large corporations, who discovered an undescended testis on the left side and advised patient to be operated on. Neither the patient nor his parents were aware of the condition before this examination. The left side of the scrotum is empty, the right side contains an apparently normal testis. In the left inguinal region is a round, soft mass about two-thirds the size of the right testis, which lies immediately beneath the skin, just over the left inguinal canal. There is no impulse on coughing, and traction upon the tumor does not enable one to bring it down into the scrotum. This last test is, in my opinion, a very important one in considering the advisability of operation in general, in cases of non-descent of the testis. Formerly it was my custom to advise parents to wait until the age of puberty before operating for a non-descent. Gradually I lowered this age, so that in the past few years I have made it my practice to advise operation as early as the third or fourth year if traction upon the testis lying either in the inguinal canal itself or just external to it does not enable one to bring the testis readily down to the lower end of the scrotum. One sees many cases in children in which the inguinal canal is weak, and the testis at the first inspection is found lying at the bottom of the scrotum and then by the

action of the cremasters is drawn up into the inguinal canal.
These are not cases for operation, as in the majority the testis
will ultimately descend and remain in the scrotum.

When one makes traction through the intact skin upon a high-
lying testis, and is only able to push it down to the level of the
external ring, I do not believe that much is gained by waiting,
and knowing as we do, from the work of Uffreduzzi, that only
in about 10 per cent. of the cases does normal spermatogenesis
take place in cases of non-descent of the testis, it is better to ad-
vise early operation. Eccles, in his book on "Non-descent of the
Testis," calls attention to the fact that the development of the
testis in cases of imperfect descent is more and more imperfect
as one approaches puberty, and this, to my mind, is another argu-
ment in favor of early operation.

The case which I show today impresses us before operation
as being one of the variety where the testis has been arrested in
its descent in the second or inguinal position. I only wish to
recall a few general facts in connection with non-descent in order
that you may understand this particular case.

It is necessary to distinguish clinically between an arrest of
the testis in its normal course and a deviation from such a normal
direction. Under the former heading the testis may be arrested
in: (a) the iliac fossa (abdominal retention or arrest), (b) the
inguinal canal (inguinal retention or arrest), and (c) retention
just beyond the external ring (upper scrotal type of arrest).
Under deviation from a normal direction we speak of a pubic,
femoral, or perineal testis, according to the abnormal position to
which the testis has been withdrawn by one of the four tails of
the gubernaculum.[1] Almost invariably a non-descent or abnormal
descent of the testis is accompanied by a hernia, which descends
along the inguinal canal into the scrotum in the former class, and
does not differ in its anatomy or contents from those of an ordi-
nary inguinal hernia of the indirect variety. In the cases of
abnormal descent (femoral, pubic, or perineal testis) the sac
accompanies the testis to its aberrant position. In connection

[1] For further information the reader is referred to a recent
article by the author in Annals of Surgery, September, 1916.

with the cases of arrest of the testis in its normal course we have a special variety of hernia to which the name "interstitial" has been given. There are of this latter form three locations in which the sac may be found: The first and most frequent is one in which the sac is found between the internal and external oblique abdominal muscles and is continuous with the main sac in the inguinal canal. The second variety of interstitial hernia is where the sac lies or has extended up between the external oblique aponeurosis and the skin overlying the inguinal region. The third variety is commonly called a "properitoneal hernia," the sac being found between the peritoneum and the transversalis fascia. There are several peculiarities of these interstitial herniæ of which it is necessary to speak: namely, that the sac may often be of an hour-glass form, one-half extending in an upward direction between the layers of the abdominal wall and the other in a downward direction toward the scrotum. Not every case of interstitial hernia is associated with non-descent of the testes, because the condition may be found in the female. Coley (Annals of Surgery, 1909) shows a number of illustrations of such interstitial herniæ in the female, in one of which strangulation occurred. In the case we are to operate today my diagnosis is that of nondescent with associated interstitial hernia, on account of the superficial position of the testis, apparently external to and lying upon the inguinal canal.

OPERATION

Incision from spine of pubis (Fig. 142, 1) to a point a little above the middle of Poupart's ligament. Upon dividing the skin and subcutaneous fat the testis and a fairly large hernial sac is found lying upon and intimately connected by many fibrous bands with the aponeurosis of the external oblique muscle (Fig. 142, 2). Upon separating these the testis and sac can be traced down to the external abdominal ring, the sac itself continuing up into the inguinal canal to the internal ring. Upon opening the inguinal canal in order to follow the sac upward I desire to call your attention to what I consider to be one of the most important causes not only of inguinal herniæ in general, but of arrests of

Testis and sac
held away from
abdominal wall

1

2

3

Testis and sac

Deficient conjoined
tendon

Tom Jones
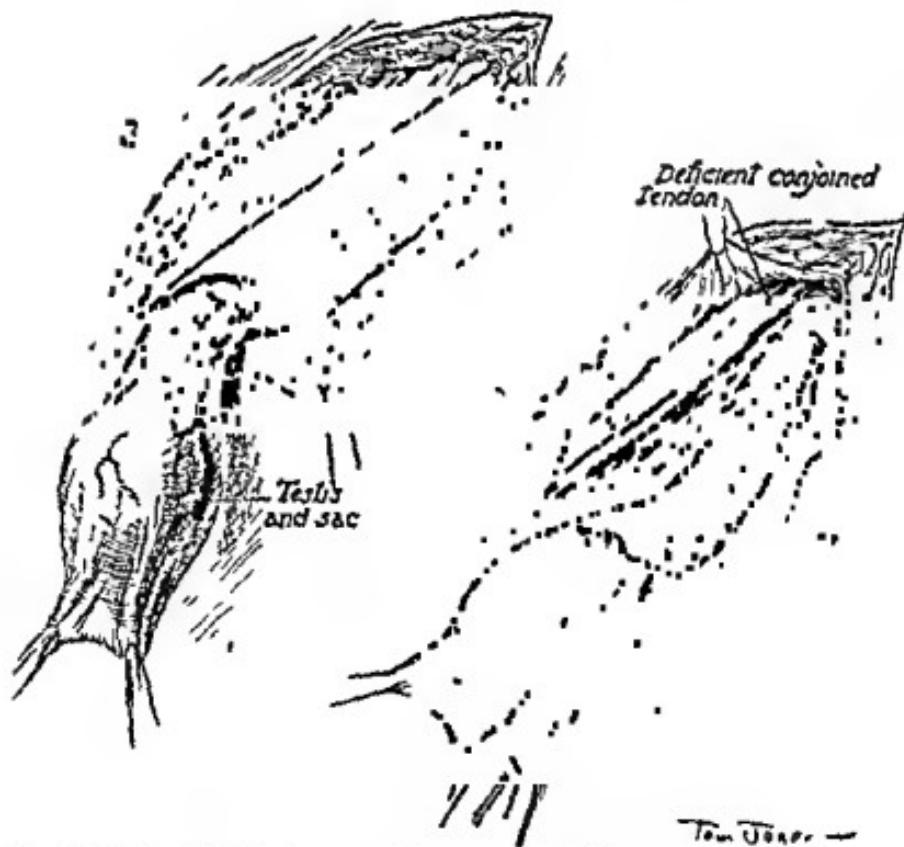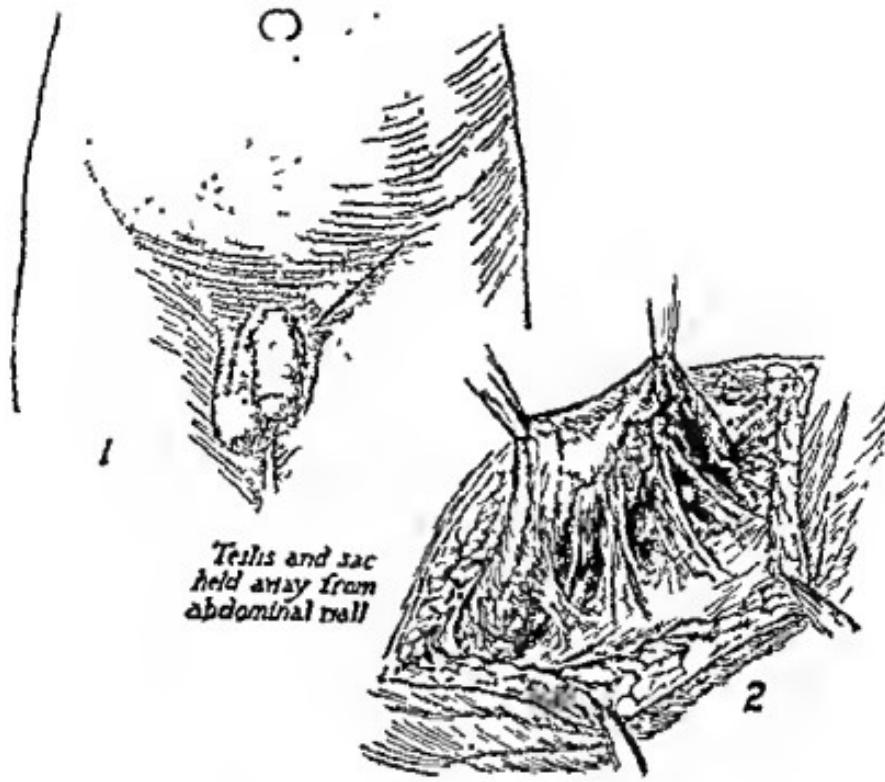
Figs 142, 143 —Technic of repair of inguinosuperficial hernia associated with non-descent of the testis

370

5

sac

6

Everted distal end of sac

Beginning of repair of inguinal canal without transplantation of cord

7

Testis placed in lower end of scrotum

Fig 143.

371
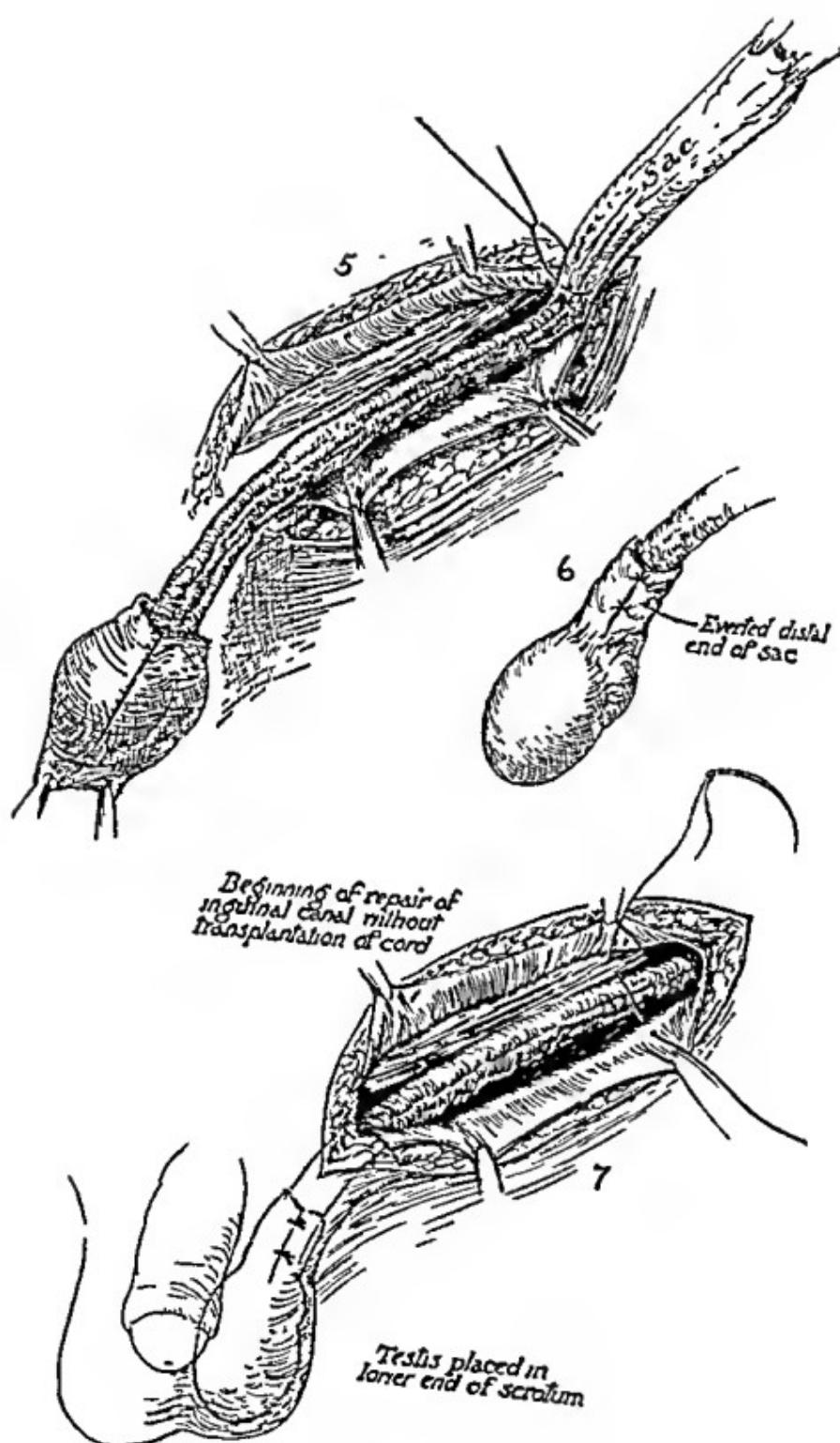
descent of the testis, namely, the lack of development of the
internal oblique and conjoined tendon, which fail to act in their
normal capacity as a sphincter in the inguinal region (Fig. 142, 3).
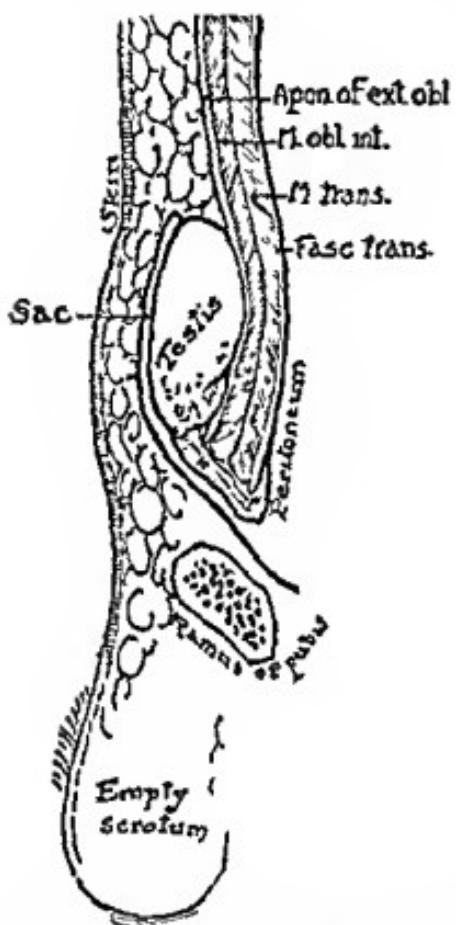
Fig 144 —Case of inguinosuperficial
hernia, the sac and testis lying between
the external oblique aponeurosis and the
skin The sac is of the hour glass form,
one half lying in the inguinal canal with
the constriction at the external ring, and
the other half with the testis lying be-
tween the skin and external oblique ap-
oneurosis

Upon freeing the testis
from the external oblique
aponeurosis and the sac as
far as the internal ring, the
next step is to separate the
vas and its vessels in the
most careful manner from
the posterior surface of the
sac. I desire to call your
attention to the necessity of
employing very small instru-
ments in separating these
structures from the sac, of
which they seem to form a
portion. If the sac is rotated
and traction made upon its
lower end, the vas and ves-
sels can be seen lying much
farther apart than they do
in the adult. This is impor-
tant to know, since the be-
ginner will often miss isolat-
ing the main spermatic veins
on account of the distance
which they lie away from
the vas deferens   When
the sac is fairly thick, as
in this case, the separation
of the structures of the
cord is a comparatively
easy task, but when it is
extremely thin the utmost care must be exercised in the separa-
tion. After this step has been accomplished the sac is divided
transversely (Fig. 142, 4) close to the testis. Then, while the

sac is grasped with an artery forceps, a finger covered with a piece of gauze is employed to separate the vessels which are the chief source of difficulty in bringing down the testis from the sac This point is one of the most important to which Dr A D Bevan has called attention, and, as he so frequently states if one can secure complete separation of the vessels high up it is scarcely ever necessary either to resect the veins or to resort to any such expedient as ligating the deep epigastric vessels or passing the testis to the inner side of them in cases of non descent I prefer not to ligate the proximal end of the sac until this high separation (Fig 143, 5) has been completed The distal end of the sac is everted around the testis and lowermost end of the cord with fine catgut sutures in order to prevent the occurrence of a postoperative hydrocele The testis is held by an assistant at the lower end of the scrotum while a purse string suture as first suggested by Dr Bevan is inserted at the level of the ex ternal ring in order to prevent the testis from pulling up into the canal This suture can be inserted without any danger of pres sure upon the structures of the cord The inguinal canal is repaired by Andrews' modification of the Bassini method with out transplantation of the cord In children I close the skin with a chromic catgut suture and apply a cast extending from the level of the umbilicus across the inguinal region to the middle of the thigh This not only prevents soiling of the dressings by urine but enables one to get the child out of bed upon the day following the operation

In this case we have an example of the second most frequent variety of interstitial hernia, namely the inguinosuperficial type, in which the testis and the sac lie between the external oblique aponeurosis and the skin (Fig 144)

SUPPURATIVE PERICARDITIS—DEMONSTRATION OF A CASE ONE YEAR AFTER OPERATION

Summary A boy with multiple suppurating foci culminating in an attack of suppurative pericarditis which healed as the result of operation, diagnosis of suppurative pericarditis, aspiration for diagnostic purposes dangerous and unnecessary, technic of drainage of pericardium, diagnosis of adhesive pericarditis, its influence in the prognosis of the present case general features of suppurative pericarditis

November 17, 1916.

ONE year ago this patient, a boy of ten, entered the hospital with a diagnosis of osteomyelitis of the fifth metatarsal of the left foot, of the left tibia, and the left humerus The metatarsal lesion had been exposed before the boy entered the hospital The tibia and humerus were opened and drained Later the right fibula, the lower end of the left femur, the upper end of the right femur, and right radius became involved, and these lesions were likewise opened and drained Following each operative procedure the child showed improvement for a time, and then slipped back with a high temperature and pulse and an increased leukocyte count One month after admission it was noticed the temperature and pulse remained high even though the bone lesions were open and draining The white count increased to 20,000, there were slight cyanosis, some respiratory distress, and general discomfort about the chest. Examination showed temperature 101° F, pulse 136, respirations 40 The eyes reacted normally to light and accommodation, ears, normal hearing, no discharge, no tenderness over mastoid processes, tonsils negative; several decomposed teeth Chest· lungs clear, pleural cavities contained no free fluid. The heart dulness extended from the left axillary line to a point 1½ inches to the right of the sternum. The upper margin of dulness extended into the second interspace The apex-beat was not palpable. The abdomen contained no free

fluid   The liver margin was 1 inch above the anterosuperior
iliac spine   x Ray examination showed the heart and pericardial
shadow as pictured in Fig 145

Fig 145 —Suppurative pericard tis before dra nage of the pericard um   Note
the balloon ng out of the pericard um especially about the base of the heart it
appears to occupy nearly one half of the thorac c cavity

Because of the temperature and pulse the high leukocyte
count the cyanosis the heart area verified by x ray the dis
placed liver and the presence of an infection the diagnosis of
purulent pericarditis was made   There was no irregularity of

pulse or pain in arms Because of the danger of puncturing and infecting the left pleural cavity it did not seem wise to use an exploratory needle to confirm the diagnosis until operation was permitted by the parents. Under ether a needle was passed close to
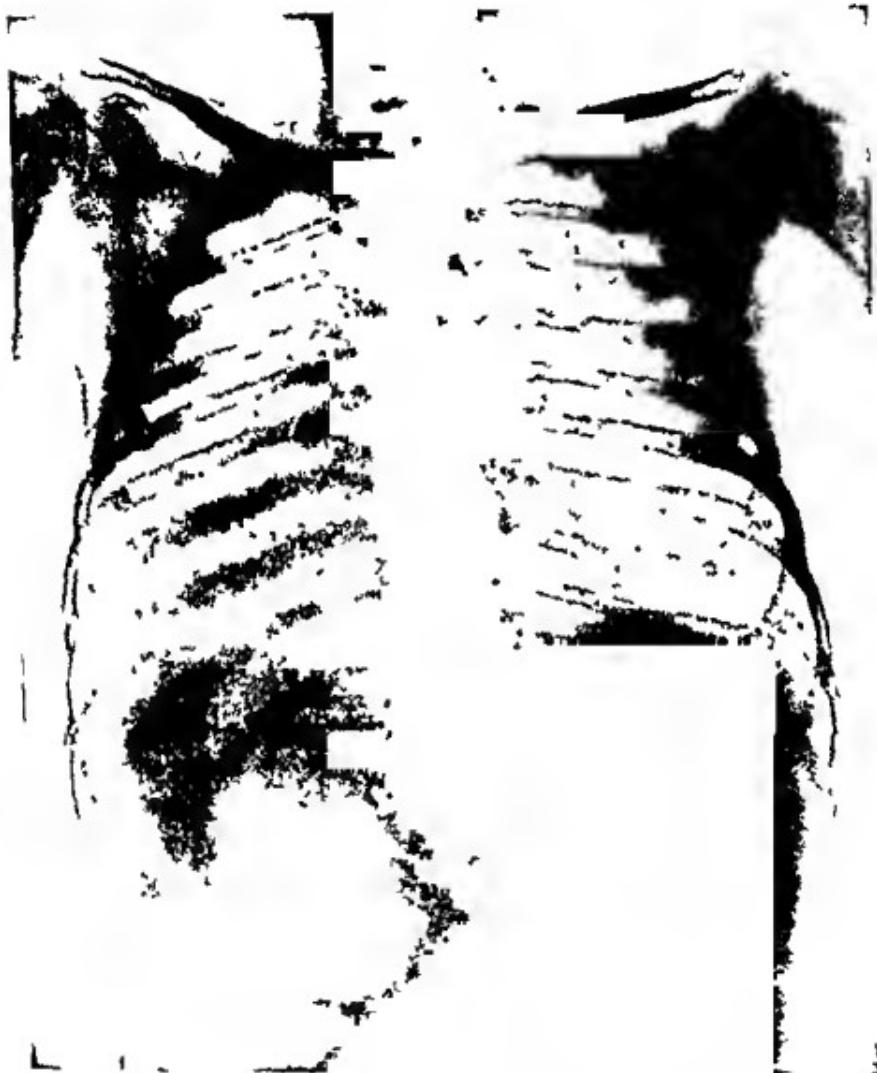

Fig 146—Suppurative pericarditis one year after cure by drainage   Compare the relative size of the heart shadow here with that in Fig 145

the sternum in the fifth intercostal space. Pus was obtained. The fourth and fifth costal cartilages were resected for an inch, the internal mammary vessels secured, the left pleura pushed outward, and the pericardium exposed. An artery forceps was

forced into the pericardial cavity by the side of the exploratory
needle   A large quantity of pus was allowed to escape slowly
A soft rubber tube was sutured in the pericardial cavity   Drain
age continued for several weeks   The pericardial shadow di
minished as was shown by x ray examinations   the liver returned
to its normal position   the cyanosis and dyspnea disappeared
and the pericardial wound healed in about four weeks   Bac
teriologic examination showed pure cultures of Staphylococcus
aureus in all lesions   The parents took the child from the hos
pital before his treatment was completed

x Ray examination today November 17 1916 one year
after the pericardial drainage, shows the heart boundaries as
indicated in Fig 146   The child is attending school regularly and
is in about the same condition of nutrition as his brothers and
sisters   He is not very strong tires readily on exertion but says
he feels good

Upon physical examination we find a slender small boy   The
head is negative

Neck—Normal contour arteries fill in normal manner no
abnormal pulsations the veins are not distended

Chest—Scar in fourth and fifth interspaces just left of left
sternal border

Systolic retraction of precordial region except in the apex
region where a positive apex pulsation is seen 10 cm from the
midsternal line i e just inside the line of the left nipple

Broadbent s sign is noted in the left posterior inferior and
lateral thoracic region

Relative cardiac dulness—left border shows a mitral configu
ration right border not demonstrable   Absolute cardiac dul
ness—normal area but no obliteration on deep inspiration

Lungs—Inspection and palpation negative   Percussion—
hyperresonant throughout upper borders symmetric and normal
Lower borders—right excursion 4 cm   left no excursion

Auscultation negative

Abdomen spleen and liver—normal dulness and normal posi
tion abdomen otherwise negative

Extremities—Evidence of disease in left humerus and right
radius   Scars of former lesions present

Here, then, are definite evidences of this boy's past illness and a foreshadowing of the trouble which we feel is in store for him as its result You have observed the systolic retraction of the precordial region, the systolic tug laterally and posteriorly (Broadbent's sign), the failure of the absolute cardiac dulness to be affected on deep inspiration, and the absence of excursion of the lower border of the left lung All this means but one thing, namely, that we are dealing now with a case of adhesive pericarditis, and not only is the pericardium adherent to the heart, but it also is involved in a chronic mediastinitis and fusion of the pericardium with the pleura and to the chest walls I am demonstrating this case to you because it not only is a very good example of acute suppurative pericarditis successfully treated, in so far as the immediate lesion was concerned but it also presents so beautifully the typical postoperative results which show us why the ultimate prognosis is so unfavorable, especially in children Fischer reports that few cases pass beyond the age of puberty The adhesion of the visceral and parietal layers of the pericardium to one another, and the adhesion of the outer layer of the sac to the other mediastinal structures, to the sternum and to the spinal column result in interference of normal development of the heart and loss of the patient from exhaustion Treatment is problematic Rehn advises longitudinal splitting of the sternum to permit of the readjustment of the heart and neighboring structures lying beneath the sternum

What about the relation of the clinical findings and course of the acute disease in this boy as compared with the general run of cases? I shall mention briefly the more important points

The development of the pericardial distention to the limit of elasticity of the sac with the resultant cardiac depression was quite evident in our case Rehn has described this condition as ' Herzdruck," and Rose as "Herztamponade" It is produced when the extra auricular pressure of the fluid equals or exceeds the intra auricular pressure The symptoms are cyanosis respiratory distress precordial pain and a feeling of oppression in the chest. Pain and swelling of the arms and marked irregularity of the pulse have been described, but were not present in our case

In the majority of cases the heart has been described as in an anterior position held forward against the pericardium by the exudate In our patient there was fluid between the heart and anterior pericardium as was shown by the exploratory needle and by the tip of the forceps which were passed into the peri cardial sac

Aspiration of the pericardium for treatment or diagnosis is not advisable because of the danger of infecting the pleural cavity Fevrier reports 9 cases treated by aspiration alone with a mortality of 100 per cent The position of the right border of the left pleura is so variable that no accurate idea of its relations to the pericardium is possible

The prognosis of untreated cases or cases handled by aspira tion is almost nothing The mortality following direct incision of the pericardium is between 45 and 50 per cent There are two chief routes of approach The first is Resection of the fourth or fifth or both the costal cartilages and exposure of the pericardium by pushing outward the left pleura A second method is that described by Mintz An incision is made parallel with the under border of the seventh costal cartilage The cartilage is re sected exposing at once the pericardium without danger of injury to the pleura

Free continuous drainage must be obtained or the purpose of the resection is lost Irrigation has been advised We did not use it in our case as it did not seem indicated The child im proved rapidly with drainage which was continuous and gradually diminishing Drainage material has varied One case of death due to a rubber tube with pressure necrosis of the heart wall has been reported Gutta percha strips have been advocated In our case we used a small caliber soft rubber tube

The literature of operative interference in suppurative peri carditis has been reviewed recently in The Annals of Surgery (1915 lxii p 660) by C B Rhodes who was able to gather 86 cases He does not include paracentesis under operative treat ment Rhode s article is complete with bibliography and I should recommend it to any of you who might desire to study this subject more exhaustively

CLINIC OF DR. D. B. PHEMISTER

Presbyterian Hospital

CHRONIC LUNG ABSCESS WITH PULMONARY HYPER-TROPHIC OSTEO-ARTHROPATHY

Summary History and physical examination illustrative of the essential points in the diagnosis of lung abscess, cause and characteristics of pulmonary hypertrophic osteo-arthropathy, investigation of bacteriologic factors in present case, experimental results, operative treatment of lung abscess—results, objections to insertion of drainage-tubes in chest above level of the seventh rib posteriorly the Friedrich operation for lung abscess and bronchial fistula, disappearance of the bone changes as the lung abscess healed

October 19, 1916.

THIS man is thirty-two years old and a teamster by occupation He has always been well until about one and one-half years ago, when, while working, be was taken with pain in the right side of the chest, which did not lay him up, but which was fairly severe It continued and was followed by some cough, but the cough was associated with very little expectoration He continued to work with the pain in his right side and the small amount of cough for about two months During this time he lost some in strength and weight and had a little fever At the end of two months he grew worse, began coughing severely, and expectorating a large amount of purulent material He had to stop work and began running a temperature and losing more in strength and weight He went into a hospital at that time and was examined and told that he had some process on the right side of the chest They did not state whether it was a tuberculosis of the lung or a lung abscess, but he stayed there for a number of months and continued to run a temperature and expectorate foul-smelling material

Numerous sputum examinations were made and no tubercle bacilli were found He left that hospital in about three months

and later went to another hospital, where he stayed for about
two months There repeated sputum examinations failed to re-
veal tubercle bacilli Upon leaving that hospital he went out to
the county institution for the tuberculous at Oak Forest, where
he continued very much the same The reports from Oak Forest,
which I have seen, state that no tubercle bacilli were found in the
sputum During this entire period he ran a temperature ranging
from 100° to 101° F most of the time He felt badly and was
unable to work He lost 48 pounds in weight

In July, while at Oak Forest, he had some pains in the arms
and legs, and particularly about the knee-, ankle-, elbow , and
wrist joints He says that the pains lasted for a week or so and
gradually subsided There was some edema about the ankles
at the time Since then he has had no symptoms referable to
his extremities

He came to the Surgical Clinic at Rush Medical College
August 14, 1916 At that time he was complaining of more or
less pain in the right side, weakness, and profuse expectoration of
foul smelling material Upon physical examination he was found
to be in a marked state of emaciation with a somewhat hectic
appearance He was coughing up a profuse and extremely fetid
discharge, amounting to four or five sputum cupfuls in twenty
four hours The extremities were emaciated and there was
marked clubbing of his fingers and toes with extreme curvature of
the nails There was noticeable enlargement of the ends of the
bones of the forearms and legs There was no cyanosis of the
extremities at that time and there never had been Physical
examination of the chest showed evidences of marked involvement
of the middle portion of the right lung There was dulness which
extended from the third to the eighth ribs posteriorly and from
the second to the fifth ribs anteriorly Vocal fremitus and breath
sounds were diminished over this area Breathing was high
pitched and very feeble In addition, there were signs of an ob
literation of the pleural cavity on the right side, with absence of
respiratory excursion at any of the lung borders

Here is the x ray picture of his chest at that time (Fig 147)
You see a very heavy shadow in the region of the dulness, it has

an uneven outline and is of much the same density throughout. We do not see any cavity containing fluid and a fluid level, as we occasionally see in an abscess communicating with a bronchus If you have an abscess containing air and fluid, the fluid will settle and there will be a sharp horizontal line separating the two (Compare with Fig 148) The density of this shadow is due to the very extensive induration of the abscess wall,

Fig 147 —Röntgenogram of lung abscess of sixteen months' standing

which is indicative of its long standing A recent abscess would have little induration of its walls

The patient was kept under observation in the ward for one week During this time he ran a temperature from 99° F. in the morning to 100° and 102° F in the afternoon We made repeated sputum examinations and could not find any tubercle bacilli

From the duration of this process, the large amount of foul expectoration, the continued absence of tubercle bacilli, the ob-

within the thorax and in the order of their importance are as
follows Chronic lung abscess bronchiectasis pulmonary tuber
culosis with cavity formation and chronic empyema Actino
mycosis of the lung might have to be considered and lesions of
the heart particularly the congenital heart lesions may lead to
a clubbing of the fingers but only very rarely to a periosteal hy
pertrophy in the bones of the extremities A not uncommon
cause of clubbing of the fingers is long standing jaundice A
patient with common duct obstruction from stone in the ampulla
of Vater carcinoma of the head of the pancreas or benign stenosis
will have clubbing of the fingers in a very few weeks and if the
process lasts long enough periosteal thickening of the bones of the
extremities will result Very rarely chronic suppurative proc
esses in the abdomen will produce these changes as well as
chronic infections of the kidney a long standing dysentery and
chronic liver abscess However the changes in the extremities
produced by lesions outside of the chest are usually limited to
clubbing of the fingers the periosteal thickening being either
absent or limited in amount Just why a chronic inflammatory

region This is supported by the fact that chronic pulmonary
tuberculosis with considerable circulatory embarrassment will
not produce bony changes except when there is cavity formation
and secondary infection Cultures were made of the sputum from
this patient by Dr George Coleman and the Bacillus annuli
formans Streptococcus viridans and a hemolytic streptococcus
were isolated Broth cultures were made and toxins of the or
ganisms were prepared These toxins were injected into a series
of rabbits over a period of six weeks The lung of one rabbit was
kept collapsed and the femoral vein of another was ligated in an
endeavor to simulate to some extent the circulatory disturbances
in this patient but no bony changes or clubbing of the toes were
produced

The urine examination in this case was negative and there
were no evidences of amyloid disease To be sure that this

n suggested that Beck's paste injected
of value, but I do not believe its effect
decompressing operation on the chest
permitting collapse of the lung and of the
'rich operation is the operation of choice
incision is made from the second rib an-
1 inch to the right of the sternal margin,
ckward to about the tenth rib, and then
midway between the mesial border of the
s processes to the third rib posteriorly.
and angle of scapula is dissected upward
The periosteum is split along each rib,
ment it is stripped off, and the entire rib
posteriorly is removed from the second
Then the flap is brought down and
chest is held in a collapsed condition by
ges   This operation may lead to healing
s without preliminary drainage, or if pre-
en established and has been unsuccessful,
d to a cure. As the procedure is an ex-
perative risk considerable it should be
after the drainage of the abscess, there
cy for it to heal.
n the lung abscess in this case there has
e bony changes. You see in the x-ray
condensation and lamellation of the
ong the bones of the forearms and legs.
tion with the x-ray and expect it event-
e healing process in the lung abscess

142 pounds when he came in As a result of the operation he
went down to 135 but now has gained 20 pounds and feels very
greatly improved I will show you the x ray plate of his chest
made recently It shows as you see a marked resolution of the
shadow cast by the abscess in the former plate There is a de-
crease in size as well as in the density of the shadow (Fig 148)

Can you offer any criticism of the operation? From the
plate you can see that the fifth rib posteriorly was resected
This is over the upper portion of the cavity I think it would
have been better had I resected two ribs lower because when the
patient is in the upright position the drainage would then be in
the most dependent portion of the abscess It was my intention
to resect the seventh rib but with the patient on his left side and
the right arm thrown forward and upward the angle of the scapula
was also elevated This made me resect the rib higher up reckon
ing that the angle of the scapula was still at the seventh rib
For that reason if you are going to use the angle of the scapula
as a guide in identifying the seventh rib in cases of rib resection
be sure you have the arm by the side when you make your de
ductions Rib resection at the level at which I made it is ob
jectionable not only because of poorer gravity drainage but be
cause of pinching of the tube by the scapula and fixation of the
scapula by the formation of adhesions This has occurred here
and as a result the movements of the right arm are still decidedly
restricted

What will be the outcome in this case? Will the abscess go on
to healing and leave no sequelæ? An acute lung abscess if it is
drained or ruptures into a bronchus is usually followed by heal
ing but a chronic lung abscess with marked induration of its
walls and obliteration of the pleural cavity even if it is drained
to the outside is very slow about closing Here there is still a
communication with the bronchus When the patient coughs or
takes a deep breath the air passes in and out of the tube We
know that it does not go into the pleural cavity because the
pleural cavity is obliterated Bronchial fistulæ sometimes per
sist and are very resistant to all forms of treatment

If this abscess does not heal what additional measures might

be resorted to? It has been suggested that Beck's paste injected into the fistula might be of value, but I do not believe its effect would be curative. A decompressing operation on the chest wall could be performed, permitting collapse of the lung and of the abscess wall. The Friedrich operation is the operation of choice in such cases. In it an incision is made from the second rib anteriorly, beginning about 1 inch to the right of the sternal margin, running downward and backward to about the tenth rib, and then backward and upward midway between the mesial border of the scapula and the spinous processes to the third rib posteriorly. A flap including muscles and angle of scapula is dissected upward and the ribs exposed. The periosteum is split along each rib, and with a special instrument it is stripped off, and the entire rib except a small portion posteriorly is removed from the second to the tenth inclusive. Then the flap is brought down and sutured in place. The chest is held in a collapsed condition by properly applied bandages. This operation may lead to healing of a chronic lung abscess without preliminary drainage, or if preliminary drainage has been established and has been unsuccessful, its performance may lead to a cure. As the procedure is an extensive one and the operative risk considerable it should be done only when, months after the drainage of the abscess, there appears to be no tendency for it to heal.

With improvement in the lung abscess in this case there has been a diminution in the bony changes. You see in the x-ray plates made recently a condensation and lamellation of the periosteal thickening along the bones of the forearms and legs. We will follow this condition with the x-ray and expect it eventually to disappear as the healing process in the lung abscess advances.
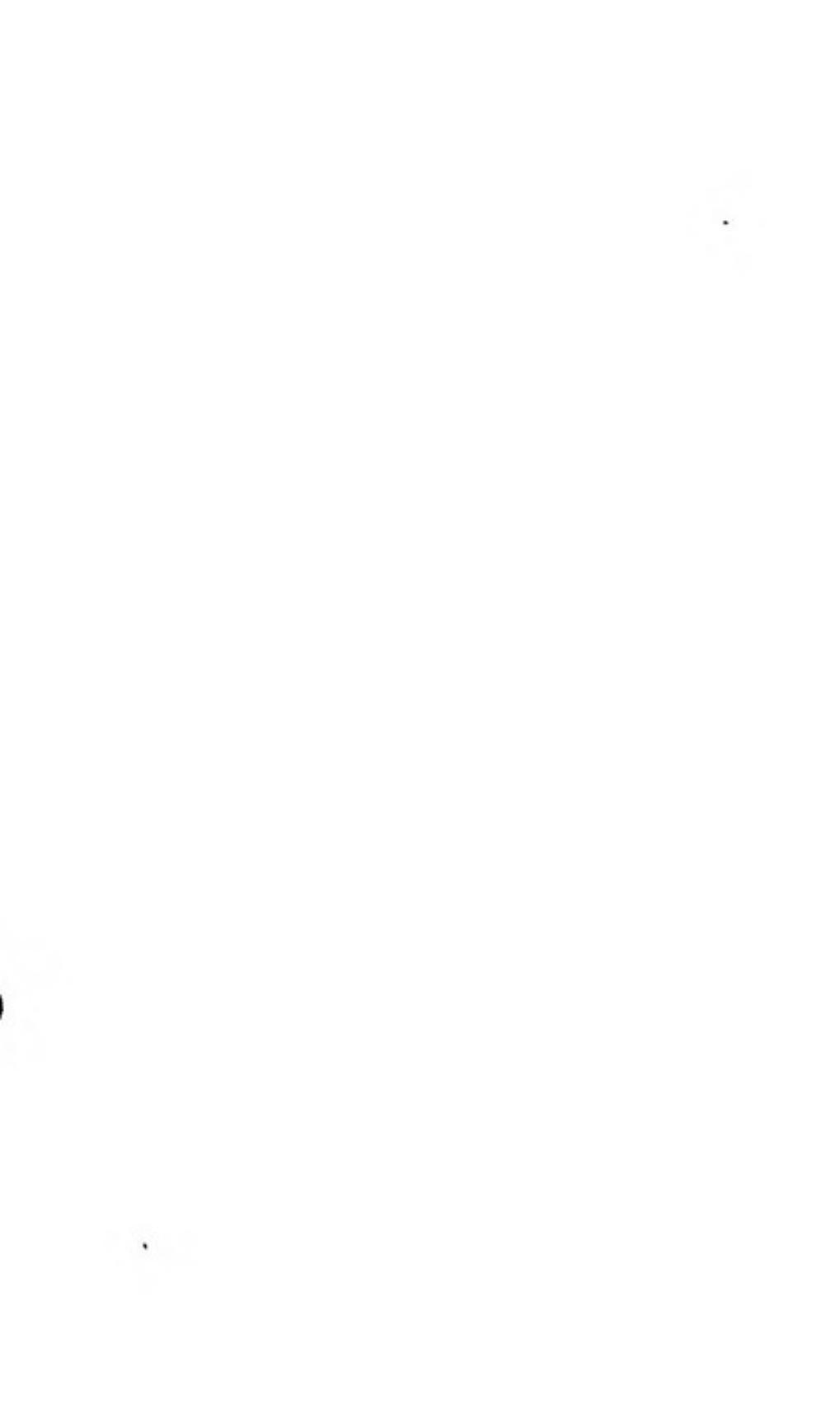
DEMONSTRATION AND REDUCTION OF AN OLD SUB-CORACOID DISLOCATION OF THE SHOULDER

BY DR. DAVID C. STRAUS

Summary A patient with a shoulder dislocation of two months' duration, signs of dislocation of the shoulder—Dugas' test, Callaway's test, Bryant's test, value of stereoscopic röntgenograms, mechanism of shoulder dislocation, incomplete dislocation, complete dislocation, anatomic varieties, luxatio axil lans erecta, "old" dislocations, changes in the tissues in old dislocations—importance of the retracted subscapularis muscle in preventing reduction, other factors, indications for open operation, arthrotomy the operation of choice, the Dollinger operation, reduction without open operation

THIS patient, a female, fifty-two years of age, comes to the hospital because of limitation of motion and lameness in the right shoulder-joint

The trouble started two months ago, when the patient fell to the ground during a convulsion The patient does not know how she landed After the fall she could not move the right arm at the shoulder very well, and had pain in the shoulder and in the muscles of the right upper arm She noticed that the skin about the shoulder region was discolored, black and blue. A physician who was called had a röntgenogram taken. This, he said, showed that the shoulder was dislocated. He manipulated the shoulder and believed he had reduced the dislocation He did not immobilize the arm, and she has been using it to the best of her ability ever since the accident. The arm has not recovered its former usefulness, however, and she comes to the hospital to find out if something can be done for the condition

As may readily be seen, we have here what you will all probably recognize, a typical picture of a subcoracoid disloca-

tion of the shoulder   We make this diagnosis from the following findings On inspection you will note that the right shoulder is flattened that this bone the acromion process is unduly prominent that the right arm is held in an unnatural position being abducted in an awkward manner, and that there is an abnormal prominence below the coracoid process Palpation shows that the glenoid cavity is empty and that nothing but soft parts intervene between the palpating finger and the glenoid cavity which is felt to be smooth The head of the humerus can be felt under the coracoid process of the scapula We next direct our attention to the *special signs* or *tests* which are present in almost all varieties of *dislocation of the shoulder* We will consider them in the order of their importance (*a*) The elbow as you see is abducted somewhat from the side of the chest In case a dislocation is present it is impossible to place the hand on the opposite shoulder and at the same time bring the elbow against the chest wall This is called *Dugas test* This test is positive in almost all dislocations of the shoulder though it may sometimes be negative in the subcoracoid type We will try the test You see the test is positive in our case (*b*) The vertical measurement around the axilla is increased—this is called *Callaways test* In our case the measurement is 40 cm on the right side and 36 cm on the left or normal side (*c*) Inspection shows that the anterior or posterior axillary fold is lowered This is called *Bryants test* In our case you see that the right anterior axillary fold is lower than the left Finally after completing the physical examination *a set of stereoscopic rontgenograms* should be taken These are of the greatest value in cases of this kind not only as a means of diagnosis but also as an aid in directing our treatment This will be referred to later Stereoscopic rontgenograms have been taken in this case and, they confirm our diagnosis as you can see (Fig 151) You see the glenoid cavity is empty and the head of the humerus lies in front of internal to and a little below its normal site and rests on the anterior surface of the neck of the scapula below the coracoid process You notice that there is an irregular defect at the lateral side of the largest part of the head and that

there is a fragment of bone, covered with periosteum, lying just lateral to and in contact with the periosteum of the portion of the greater tuberosity, just below the defect to which we just called your attention You see there has been a fracture of the lateral facet of the greater tuberosity Dislocation of the shoulder is one of the important causes of fractures of the greater tuberosity of the humerus.

Fig 151 —Subcoracoid dislocation, eight weeks' duration Rontgenogram taken before reduction (one of a stereoscopic set)

Before speaking of the indications in this case and proceeding with the treatment, it might be well to review very briefly the various types of anterior dislocations of the shoulder, and to say a few words about old anterior dislocations of the shoulder in general

Dislocation of the shoulder is by far the most frequent form of dislocation, occurring with slightly greater frequency than all other forms of dislocation combined; statistics show that it

constitutes from 52 to 55 per cent of all dislocations[1] This
great frequency of shoulder dislocations is explained by (a)
the exposed position of the shoulder, (b) the very great range
of movement of the joint, (c) the marked disproportion between
the comparatively large head of the humerus and the relatively
small and quite shallow glenoid cavity, the surface of which
is only one quarter to one third of the head of the humerus,
(d) the long leverage afforded by the humerus, the entire upper
extremity acting as the long arm of the lever, (e) the weak point
in the joint capsule below and in front, and (f) the fact that the
strength of the joint depends largely on muscles The joint
capsule is reinforced above by the coracohumeral ligament
which radiates out into its upper and posterior wall The
capsule is reinforced also by the glenohumeral ligaments, the
superior middle and inferior, but these are very variable in their
development In addition, it is strengthened above and poste-
riorly by the tendons of the supraspinatus, infraspinatus and
teres minor muscles In front and above, the tendon of the
subscapularis muscle near its insertion to the humerus is
firmly attached to the joint capsule Immediately below the
joint capsule is strengthened by the long head of the triceps
Thus the weakest part of the joint capsule is anteriorly and
below between the tendons of the subscapularis and teres
major muscles This explains why forward dislocations are so
much more frequent than backward dislocations the relative
frequency being 97 5 to 2 5 per cent according to Finckh[2]

The most frequent cause of dislocation of the shoulder is
hyperabduction of the arm with the scapula fixed as a fall on
the inner side of the elbow or a sudden jerk while the hand is
held abducted above the head as while holding on a strap in
a street car which suddenly gives a jerk Any such maneuver
forces the surgical neck of the humerus upward against the
under surface of the acromion which acts as a fulcrum for
the shaft of the humerus acting as the long arm of a lever, and the

[1] Hofmeister and Schreiber Handbuch der praktischen Chirurgie 1914 vol v
p 51

[2] Finckh J v Bruns Beitrage Bd 17

head and neck of the humerus as the short arm of the lever.
The head of the humerus is thus forced against the antero-
inferior part of the capsule, the anatomically weakest point,
which gives way, and the head passes out through the rupture
in the capsule thus caused and passes downward and inward.
Any other force that presses the head of the humerus downward
and inward against this weak part of the capsule also may
cause a dislocation; for example, a force applied directly to the
upper end of the humerus, as a fall on the shoulder. Some-
times even muscular action alone will accomplish this.

In case the joint capsule is not ruptured, but is torn from its
attachment at the anterior margin of the glenoid cavity, together
with the periosteum of the neck of the scapula, the head of the
humerus will pass downward on to the neck of the scapula,
in close relationship to the glenoid cavity. This is called an
incomplete dislocation of the shoulder. The arm is strongly
rotated outward and the bicipital groove looks forward. Rarely
even a subcoracoid or intracoracoid position may occur without
rupture of the joint capsule.

If the joint capsule gives way, and the head of the humerus
passes out through a rent in the capsule, a *complete* dislocation
results. As a rule, in almost all dislocations of the shoulder,
no matter what the cause may be, the head passes out in a
downward and inward direction, through the anatomically
weakest part of the capsule, down into the subglenoid space,
and, depending on the further course of the head of the bone,
various types of forward dislocation are described. As the
case we have to deal with today is one of the forward type,
we will discuss forward dislocations only.

If the head of the humerus remains resting on the facies
subglenoidalis of the scapula, displacement upward under-
neath the coracoid process being prevented by the intact anterior
portion of the capsule, we have the so-called *axillary* dislocation.
If the cause of the dislocation is hyperabduction of the arm,
and the weight of the arm does not, as usually follows, cause
the arm to fall to the side, but the arm remains upward, while
the head of the humerus remains in the subglenoid space, we

have the rare 'luxatio axillans erecta" which occurs in about
¾ per cent of cases of forward dislocations Usually however
the force that caused the tear in the capsule continues and
carries the head forward and inward and as the arm falls to
the side the head passes inward and upward so that it comes to
rest on the anterior surface of the neck of the scapula under
neath the coracoid process This is the *subcoracoid dislocation*
(Fig 152) and is the most frequent variety In an anteroposte

Fig 152—Subcoracoid dislocation (Doll nger)

nor rontgenogram (Fig 151 the case we have to deal with
today) the coracoid process is seen to lie at about the midpoint
of the head of the humerus dividing it into two approximately
equal halves The anatomic neck rests on the anterior lip of
the glenoid fossa (Fig 152) The posterior part of the capsule
together with strengthening bands and tendons lies stretched
over the glenoid cavity and prevents the head from being carried
further toward the median line (Fig 153) In case the force
has been greater so that the head of the humerus is carried

Fig 153—Subcoracoid dislocation seen from behind The external rotators are drawn over the glenoid cavity (Dollinger)

Fig 154—Intracoracoid dislocation (Dollinger)

Fig 155—Subclavicular dislocation (Dollinger)

further medianward, so that the greater part of the head comes to lie to the medial side of the coracoid process, we have the

so called *intracoracoid dislocation* (Fig 154) The head of
the humerus lies partly upon the scapula and partly upon the
adjacent ribs The sulcus intertubercularis looks directly for-
ward To reach this position the posterior portion of the cap
sule together with the strengthening bands and the supra
and infraspinatus muscles, are either greatly stretched or,
what is more usual they are torn away from the humerus,
together with the greater tuberosity If the greater tuberosity
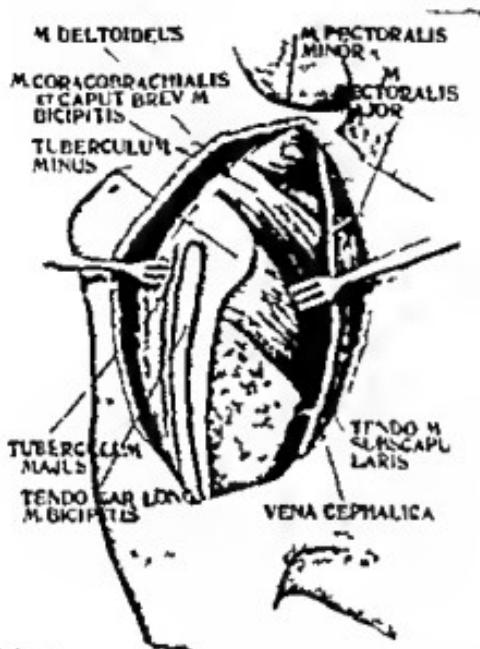
Fig 156 —Open reduction of subcoracoid d slocation Incision and anatomic rela
tions in a subcoracoid dislocation (Dollinger)

is completely torn away from the humerus it may lie in the
glenoid cavity and be an obstacle to reduction However it
often remains attached to the humerus by means of the perios
teum If the dislocating force carries the head of the humerus
still further medialward so that it comes to lie under the pec-
toralis minor muscle against the edge of the clavicle, we have
the so called *subclavicular dislocation* (Fig 155) This is quite
rare To reach this position the head frequently tears through
the subscapularis muscle button holing it, or the subscapularis

muscle is torn off from its insertion on the lesser tuberosity
The arm is often rotated inward and strongly adducted, but it
may be in almost any position as the muscles are greatly stretched
or torn   Nerve injuries, and hence paralyses, occur much more
frequently in the intracoracoid and subclavicular forms than
in the other types of forward dislocations

Without going into detail as to the symptoms of the various
forms of forward dislocation, it should be pointed out that, in
attempting to differentiate the various forms from one another,
the diagnosis is greatly aided by the rontgenogram, but one
must not depend on this alone, for a picture taken in a slightly
oblique direction may easily lead to false conclusions

We have said that the case we have to deal with today is
an *old dislocation*   What do we mean by an old dislocation?
When does a recent dislocation become old? Obviously it is
impossible to state any definite time, but *a dislocation that has
persisted for from four to six weeks may be termed old*, for by
this time all reaction in the injured tissues has passed away

Old dislocations are observed much more frequently in the
shoulder joint than in all other joints (97 5 per cent according
to Smital[1], 97 per cent according to Finckh[2])

From the clinical point of view old shoulder dislocations
may be divided into two groups   The extracoracoid and sub-
coracoid dislocations may be considered together as one group
In these the pathologic changes are not of very high grade
as a rule   Similarly, the intracoracoid and subclavicular dis-
locations may be considered together as a group   In this
group the changes are much more marked   In all old ante-
rior dislocations the dislocated head of the humerus becomes
surrounded with more or less connective tissue which prac-
tically forms a new capsule and soon entirely hides the tear
in the true capsule   The slight differences that exist between
an extracoracoid and a subcoracoid dislocation are lost in old
cases   In the *subcoracoid type* the following *pathologic and clinical
findings* exist and can be made out when open operation has to
be resorted to   The head of the humerus remains in the im-

mediate vicinity of the glenoid cavity on the neck of the scapula
The half spheric prominence that can be palpated below the
coracoid process is the greater tuberosity The greater tuberosity
is directed forward and laterally, and the lesser tuberosity is
directed forward and inward The bicipital groove with the
contained long head of the biceps shows plainly the boundary
between the two tuberosities and lies somewhere between the
coracobrachialis and short head of the biceps muscle The
greater part of the head of the humerus lies lateral to these
muscles The head of the humerus is turned backward and
lies in front of internal to and a little below its normal site,
the upper portion of the head often resting against the anterior
margin of the glenoid cavity There is frequently a vertical
groove on the head corresponding to this area of contact
which may be the result of long continued pressure or may
have been caused during forcible attempts at reduction The
cartilage covering the head of the bone if it has not been acci
dentally damaged during the trauma remains smooth and
normal in color even two or three months after the dislocation
In older cases this cartilage becomes uneven or rough and
turns brown This irregularity of the head may be due not
only to atrophy of the cartilage but also to irregular exostoses
In still older cases after one year or so the cartilage on the
anterior half of the head becomes completely eroded and the
exposed spongiosa is covered by a thin layer of smooth connec
tive tissue In very old cases the normally firm attachment
between the cartilage and the head loosens and during attempts
at reduction if great gentleness is not exercised the cartilage
may be torn away The cartilage covering the glenoid cavity
shows the same changes The heavy tendons of the supra
spinatus infraspinatus and teres minor muscles near their
insertion into the greater tuberosity are drawn inward and
cover the glenoid cavity (Fig 153) above the coracohumeral
and glenohumeral ligaments which they exceed in breadth
and thickness The posterior segment of the capsular ligament
that lies below these strengthening bands is usually not torn
in this type of dislocation and there are usually no adhesions

between the joint capsule and the cartilage covering the glenoid cavity, except in cases in which the dislocation has been of very long standing, or in case of fracture through the glenoid cavity, in which case there are adhesions between the capsule and the site of fracture

A newly formed acetabulum may develop on the neck of the scapula Adhesions may develop between its anterior segment and the anatomic and surgical neck of the humerus
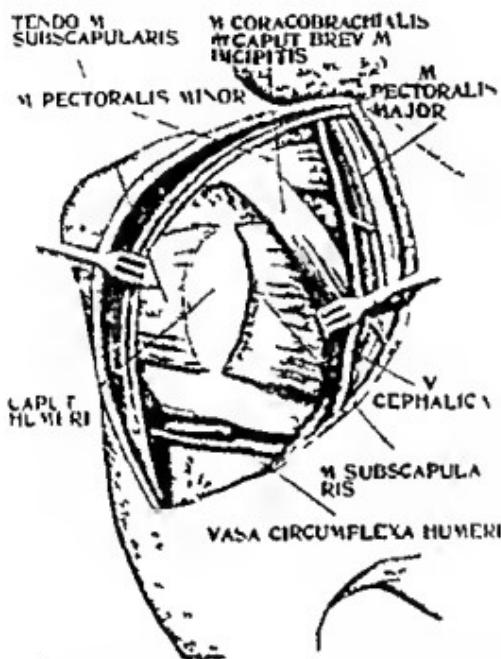
Fig 157 —Open reduction of a subcoracoid dislocation Site of division of the sub scapularis muscle and the relations of the circumflex vessels (Dollinger)

and interfere somewhat with reduction, but this is only of importance in case the dislocation is complicated by fracture of the surgical neck, and masses of callus strengthen the union between the scapula and the humerus In the absence of a fracture the adhesions do not form any marked hindrance to reduction as a rule Usually the difficulty of reducing an old shoulder dislocation is not due, as formerly believed, to newly formed connective-tissue scars, or, as Kocher[1] has stated,

[1] Kocher Deutsche Zeitschr f Chir, Bd 30, Heft 4-5, S 423-460

to adhesions in the vicinity of the old tear in the capsule between the margin of the labrum glenoidale and the anatomic neck but *as recently pointed out by Dollinger [1] the difficulty of reduc tion is due chiefly to the retracted subscapularis muscle* which because of pressure has become sclerosed Because of the dislocation the points of origin and insertion of this muscle are approximated as much as 1 to 3 cm Dollinger has never found it necessary to divide the coraco or glenohumeral ligaments which Kocher has stated constitute a hindrance to reduction Dollinger deserves the credit of having demonstrated that *if the subscapularis muscle is divided by open operation* as will be described later *reduction is easily accomplished*

In *old intracoracoid* and *old subclavicular dislocations* the head of the humerus has been displaced much further medial ward and lies for the most part or entirely internal to the coracoid process (Tig, 152 and 154) and therefore lies to the medial side of and beneath the muscles running from the coracoid process to the humerus—i e the short head of the biceps and the coracobrachialis muscles These muscles which are tensely stretched in this group of dislocations may and often do inter fere with reduction for in rotating the head of the humerus outward it catches on these muscles Therefore to reduce cases of this type one must abduct strongly and make strong traction on the arm in order to drag the head of the humerus under these muscles before one can replace it in the joint socket But in old dislocations of this type where the displacement has remained for weeks or months these muscles become sclerotic and it is not possible to draw the head outward under these muscles Dollinger and Legueu[2] have each reported a case in which it was absolutely impossible to reduce the dislocation until these muscles had been divided and Murphy[3] reported a case in which he found it necessary to temporarily resect the coracoid process and the long head of the biceps The axillary

Dollinger Ergebn sse der Chirurg e und O thopad e Bd 3 Berlin 1911 S 191

[2] Legueu Independence med 1901 No 15 (quoted by Doll nger)

[3] Murphy J B The Surg cal Clin cs of John B Murphy vol ii No 3 June 1913 p 419

vessels and the large nerve trunks lie in front of the head of
the humerus but are separated from it by the subscapularis
muscle which is bulged forward by the head of the bone   Small
tears are produced in the muscle by the trauma of the disloca
tion and in old cases the extravasation thus caused organizes
and produces adhesions between the nerves and vessels and the
muscle   The subscapularis muscle may be torn though this
is quite exceptional   The head of the humerus may perforate
the muscle button holing it or the muscle may be torn away
from its insertion on the lesser tuberosity   In either case the
head of the bone lies in immediate contact with the large nerve
trunks and vessels and may become adherent to them though
as stated before this is quite exceptional   The intracoracoid
and subclavicular dislocations are frequently complicated by
fracture of the greater tuberosity   This is due to the fact that the
tendons of the outward rotators of the arm inserted on the
greater tuberosity the supraspinatus infraspinatus and teres
minor which are drawn inward over the glenoid cavity so that
they cover the joint cavity in all forward dislocations are greatly
stretched in the intracoracoid and subclavicular types and tear
away the greater tuberosity   However another mechanism
may come into play   The anterior margin of the glenoid cavity
may be forced into the furrow between the posterior margin
of the head and the tuberculum majus and if the causal trauma
forces the head of the bone against this sharp ridge the tuber
culum majus will be cut away by this bony margin acting like
a wedge   The entire tuberosity may be torn away or only a
part of it   In our case you see from the radiograms that the
outer facet only has been torn away (Fig 151)   The *fractured
tuberosity interferes with reduction only in case it has become
adherent to the glenoid cavity or when it has become wedged in
between the glenoid cavity and the acromial process*   The long
head of the biceps is occasionally torn out from the bicipital
groove and may interfere with reduction   In addition to the
interference with reduction caused by these structures which
does not often occur *the chief obstacle to reduction in old cases
is the retracted subscapularis muscle*

In both groups of dislocations fracture of the surgical neck of the humerus may occur though this is a rarer complication Healing may have occurred in a position that makes it possible to reduce the dislocation or it may have healed in such a position that it prevents reduction The external callus may so surround the nerves and vessels and be so adherent to it is difficult or impossible to free them These cases are generally not well adapted for reduction and the results are poor as regards func
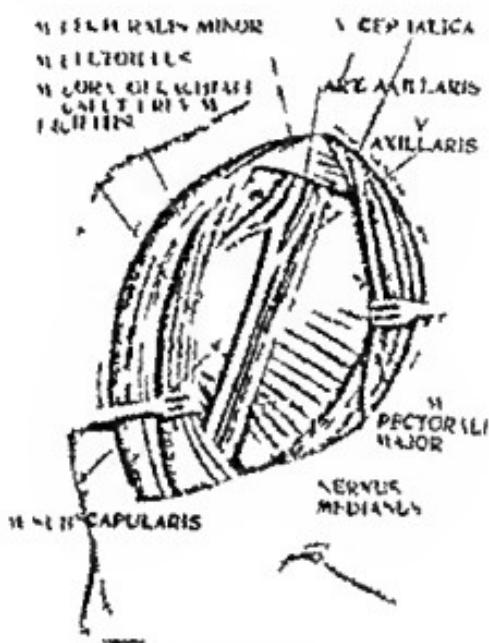
Fig 158 —Incision and anatomic relation in a case of intra oracoid dislocation
(Dollinger)

tion whether one reduces them or resects because of the callus that penetrates the muscles

While the amount of motion which the displaced head may develop depends on whether the arm has been used from the outset or not, and may vary greatly—in some cases the arm may be almost as useful as normal—as a rule an unreduced dislocation of the shoulder cripples the patient markedly This patient used her arm from the day the dislocation occurred and this explains why her limitation of motion is so slight

The chances of reduction without operation is directly de pendent upon the amount of time that has elapsed and the anatomic findings in the particular case According to the statistics collected by Finckh,[1] reduction always succeeded in uncomplicated cases that had lasted less than four weeks, was successful in 77 per cent of cases between the third to the ninth week, but was unsuccessful in all cases existing longer than fourteen weeks However there is no time limit after which reduction is no longer possible for there are rare cases reported in which reduction was accomplished after many months or even years Dislocations associated with complications are usually irreducible earlier than uncomplicated dislocations For this reason intracoracoid and subclavicular dislocations become irreducible after a few weeks if they are not irreducible from the very outset due sometimes to the interposition of the tuberculum majus which is so frequently fractured or to the obstruction offered by the long head of the biceps which is occasionally torn out from the sulcus intertubercularis, later difficulty in reduction may be due to the formation of adhesions due to the relatively great trauma to the soft parts and in par ticular to the obstruction caused by the short head of the biceps and the coracobrachialis muscles which become sclerosed and may even become ossified Old dislocations associated with damage to the large vessels or nerves or with fracture of the neck of the humerus give a notoriously bad prognosis

Thus it can be seen that the treatment of old dislocations of the shoulder requires great care and each case must be individually considered as regards the indications presented

No attempt at reduction should be made if there is no probabil ity of success especially in old weak individuals in whom the danger of producing a fracture of the humerus is greater, and particularly if the dislocation is of very long standing and there is a fair amount of mobility This is all the more true in case the patient cannot be relied upon to co-operate in the after treatment, for even if reduction is accomplished ankylosis is apt to result

[1] Finckh J   v Bruns Beitrage Bd 17

If there is no contraindication, reduction should be attempted very carefully by the various methods employed to reduce recent dislocations. But as it is essential to attempt the reduction under an anesthetic, and in case simple reduction fails, to resort to open operation to accomplish the reduction, the patient should be prepared as for any other operation, and the attempts at reduction should only be made on the operating table, everything being in readiness for the operative interference, in case that should be found necessary.

While our patient is being put under the anesthetic (we always prefer ether in these cases) we might say a few words about the *operative indications.*

In case attempts at simple reduction fail, one must consider *operative reduction and resection of the head of the humerus.* The *indication for open operation depends* on the age and social standing of the patient, the duration of the dislocation, particularly the amount of pseudo-arthrosis formation present, etc., but the indication *is absolute in case there are symptoms of pressure on nerves or vessels. Subcutaneous division* of the muscles offering resistance to reduction or of adhesions, a procedure formerly employed by many clinicians, should never be done because of the danger to important structures, especially the large vessels, which are so frequently displaced and adherent. Open reduction—*i. e., arthrotomy—has become more and more the operation of choice,* and has recently been beautifully worked out and described by Dollinger, and his report on the subject must be regarded as a classic. Only in case open reduction fails, or during an attempt at it, the necessity of *resection* becomes evident should one decide on resection. Schoch[1] recommends resection in case the head is markedly deformed and hypertrophic or the glenoid cavity has become so shallow that it offers an insufficient hold for the head.

Infection following open reduction or necrosis of the head may give the indication for *secondary resection.*

Dollinger has shown rather conclusively that the chief obstacle to reduction is not to be attributed to complications

[1] Schoch *Beiträge zur klinischen Chirurgie,* Bd. 29, Heft 1, S. 126.

on the part of the capsule, which Schoch, Kocher, and others have considered to be the prevailing obstacles to reduction in old dislocations, but retraction and sclerosis of the subscapularis muscle, which he found was present in all of his cases. His operation, and that is probably the best procedure in these cases, consists essentially in performing an open division of the subscapularis muscle, near its insertion into the lesser tuberosity. Following this the dislocation can usually be easily reduced. His technic is as follows:

With the patient in a half-sitting position, and an assistant holding the affected arm flexed at the elbow, an incision is made, beginning at the clavicle above and extending downward to the insertion of the deltoid below, the incision being carried along the line of the cephalic vein, corresponding to the groove between the pectoralis major and deltoid muscles. These two muscles are then bluntly separated, using the cephalic vein as a landmark; the deltoid is retracted laterally; the pectoralis major, together with the short head of the biceps and the coracobrachialis, are retracted medially; the pectoralis minor is retracted upward (Fig. 156). By so doing the bicipital groove and the lesser tuberosity of the humerus are exposed to view. The bicipital groove serves as the landmark for further orientation. To the medial side of this the tendon of insertion of the subscapularis muscle is found inserting on the lesser tuberosity. The assistant now rotates the arm outward, whereby the lesser tuberosity is brought more into the field. In case it is impossible to rotate the arm far enough outward to make the tendinous insertion available, an assistant applies a hook to the coracoid process and draws the scapula strongly outward and backward, away from the body, thus making the tendon of insertion accessible. This is, however, rarely necessary. In case we have to do with a subcoracoid dislocation, as today, the tendon of the subscapularis is now divided, from above downward, at the inner margin of the tuberculum minus, the scapel being carried boldly down against the bone (Fig. 157). While this is being done the arm should be held rotated outward as far as possible, as this facilitates division. One must exercise

great care in dividing the lower portion of the tendon for the anterior circumflex artery and vein (Fig 157) he directly against the neck of the humerus immediately below the lowermost small muscle bundles of the subscapularis which insert directly on to the neck of the humerus The posterior circumflex vessels and the circumflex axillary nerve course posteriorly about the neck of the humerus at the same level The large vessels and nerves lie to the inner side of the head of the humerus and are held aside with the coracobrachialis muscle As soon as the subscapularis muscle is divided it retracts for 3 to 4 cm and in this space the head of the humerus is visible The assistant now reduces the head by the usual Kocher's maneuvers which should be carried out slowly and carefully By these maneuvers adhesions about the surgical neck are broken up and as soon as this occurs reduction is easily accomplished in uncomplicated cases

In intracoracoid and subclavicular dislocations the coracobrachialis and short head of the biceps lie either in front of the tuberculum majus or lateral to it and it is not always easy to draw these muscles inward over the tuberosity to its inner side If they cannot be drawn inward they are retracted strongly outward The nerves and large blood vessels now lie exposed (these do not come into view in the subcoracoid dislocations) and the head of the humerus lies beneath them (Fig 158) The large vessels and nerves sometimes are firmly adherent to the fascia of the subscapularis muscle just at the point where one divides the tendon and in these cases one must exercise great care not to injure the artery in pushing these structures aside After the tendon of the subscapularis is divided the dislocation is reduced by means of the Kocher maneuvers but in case of intracoracoid dislocations sometimes the head of the humerus which is rotated outward catches on the short head of the biceps and the coracobrachialis muscles and it is impossible to carry it beneath these muscles In such cases the arm which is abducted and acutely flexed at the elbow is pulled downward strongly—i e caudally—and this may succeed in drawing the head of the humerus under these

muscles   Rarely it may be necessary to divide these muscles in case they are very much retracted or sclerotic   This was referred to before   After this has been done reduction is easy   The divided muscles are sutured after reduction is affected

The great tuberosity which as has been stated before is not infrequently fractured in intracoracoid and subclavicular dislocations if fractured may interfere with reduction   Dollinger found this in 3 of his 6 cases   In these cases the fractured tubercle lay in the glenoid cavity and he entered the joint by means of an incision beginning at the anterior margin of the deltoid muscle and carried transversely across the muscle to the point where it is most convex removed the tubercle from the glenoid cavity and sewed it back in its original site   Even in the cases in which the fractured tuberosity does not interfere with reduction Dollinger believes it is advisable to sew the tubercle in place as he is of the opinion that if this is not done the action of the outward rotators is forever lost   As a result of experiments on the cadaver he has evolved the following operative procedure   He enters the joint from in front as described above and by direct inspection convinces himself that the tubercle is fractured divides the subscapularis tendon has an assistant draw the arm strongly distally and then introduces the finger into the glenoid cavity through the space where the tendon was divided which can be easily done and convinces himself that the tubercle is free   Before the tendon of the subscapularis is divided it is impossible to reach into the glenoid cavity for it is covered by the outward rotators which are stretched over it   After the tendon is divided we have free access to it

In case the glenoid cavity is free the humerus is at once reduced and only after this is accomplished does one proceed to sew the fractured tubercle back into place and to do this Dollinger gains access by means of a posterior incision   However if the tubercle is adherent to the glenoid cavity he lays the patient on the sound side and enters by an incision along the posterior margin of the deltoid muscle beginning at the spine of the scapula above and carried downward as far as the inser

tion of the muscle on the humerus (Fig 159) The deltoid is
now retracted strongly forward, care being taken not to injure
the branches of the axillary nerve which come out at the posterior
margin of the muscle In case this incision is not ample, one can
gain more room by continuing the upper end of the incision
outward along the spine of the scapula for a few centimeters
and thus loosen the attachment of the posterior bundles of the
deltoid near their origin As a rule however, one is able to get
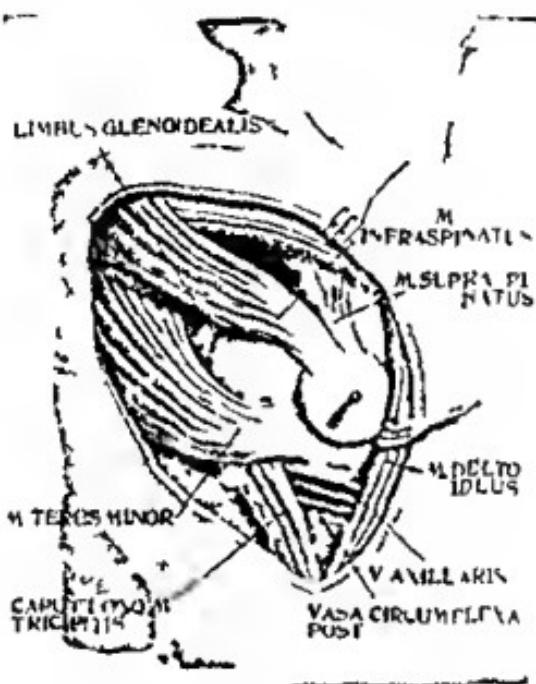
Fig 159—The incision for and one method of replacing the fractured greater
tuberosity (Dollinger)

along without this additional cut The tendons and part of
the stretched muscle bellies of the outward rotators now lie
exposed and by following these distalward we come upon the
fractured greater tuberosity This is exposed the fractured
surface freshened and then temporarily replaced If the arm
could not be reduced before this is now done This being ac
complished the site of fracture on the humerus is freshened
and then the tuberosity is attached to the humerus by means
of either periosteal sutures bone sutures or with a nail (Fig

159). Because the outward rotators are stretched, they do not interfere with the replacement of the tuberculum majus to its original site.

In case the dislocation has been of long standing, and the outward rotators are accordingly greatly stretched, it is a question whether they can shrink to their normal length so that they can functionate normally again. Further experience alone will be able to determine this.

In case the long head of the biceps is torn away from the bicipital groove, it is returned and the anterior wall of the canal is re-formed by a plastic operation, using a flap of periosteum to accomplish this. Finally, all bleeding having been absolutely checked, the margins of the muscles are united by means of a few interrupted sutures, the skin wound closed, and a collodion dressing applied, a strip of gauze having been applied over the skin incision. No drain is inserted unless the operation has been a long one or there is other reason to fear infection.

The arm is then held in a sling. The stitches are removed in eight days. After this mechanotherapy is instituted.

Now that our patient is anesthetized and everything is in readiness for the open operation, we shall attempt to reduce the dislocation manually before resorting to operative interference.

The patient being completely relaxed, we draw her to the right side of the table and have an assistant support her in a semirecumbent position. The operator now stands in front of and to the right side of the patient, as you see, grasps the patient's right wrist with his right hand and her elbow with his left hand, and slowly but forcibly presses the patient's elbow to her side. The forearm is now flexed to a right angle at the elbow, thus, and the flexed forearm is now slowly, forcibly, but carefully rotated outward, gradually overcoming the resistance due to the muscular contraction and the adhesions that may have formed, continuing the outward rotation until the forearm is directed at right angles to the body and the inner side of the arm looks forward. At the same time an assistant makes strong downward traction on the arm, holding with

both hands just above the elbow Now, holding the arm in
the same degree of outward rotation the elbow is very slowly
raised forward and upward as far as possible and an assistant
helps by directly pushing the head of the humerus upward and
outward toward the glenoid cavity, with his right hand pushing
against the inner and lower side of the head of the bone Finally
the forearm, which has been held rotated outward, is now

Fig 160—Rontgenogram taken after reduction (one of a stereoscopic set)

rotated and circumducted inward the hand passing across to
the opposite side of the chest—so We shall try again This
time you see we have succeeded The head of the humerus is
now in its normal position You see the flatness of the shoulder
has disappeared the axillæ on the two sides appear the same
Dugas sign is now negative the humerus can be moved freely
and the range of movement is normal We shall hold the arm
in this position by applying a Velpeau bandage so that the

dislocation cannot recur, and shall leave this on for ten days
Tomorrow we shall have another set of stereoscopic rontgeno
grams taken to make certain that the reduction is complete

Postscript —The pictures taken the following day showed
that the dislocation had been successfully reduced (Fig 160)

The patient was discharged from the hospital on the tenth
day, but was instructed to return daily for massage and passive
exercises

She did as instructed for the first few times, but was more
easily satisfied than were we, and she has not been seen for some
time now   The result at the time of her last visit was good, but
could have been improved by further treatment   It has doubtless
continued to improve   otherwise she would probably return
for, as mentioned at the outset, her reason for coming to the
hospital in the first place was because of limitation of motion
and lameness of the shoulder rather than because of any pain

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CLINIC OF DR. HUGH McKENNA

St. Joseph's Hospital

DEMONSTRATION OF CASES ILLUSTRATING IMPORTANT ASPECTS OF THE INDICATIONS, THE TECHNIC, AND THE RESULTS OF BONE TRANSPLANTATION AND ARTHROPLASTY

Summary First Clinic—Nov 6, 1916 Talk on the Lane technic for bone work
  Case I —Hallux valgus—transplantation of the extensor proprius hallucis tendon—importance of a dry field
  Case II —Fracture of neck of femur—operative treatment, the skin incision—exposure of joint—implantation of bone splint
  Case III —Tuberculosis of first phalanx of finger, excision of tuberculous tissue and introduction of a bone splint
  Second Clinic—Jan 16, 1917
  Case I —Further report on case of tuberculosis of finger, successful transplantation of bone into an infected area
  Case II —Ankylosis of elbow—arthroplasty, advisability of early operation in cases due to Neisserian infection, technic of raising and placing the fat and fascia flap, after treatment
  Case III —Double dislocation of shoulder with pathologic fracture of anatomic necks of both humeri as a result of muscle spasm, reduction by open operation, results
  Case IV —Fracture of humerus in man sixty four years of age, marked atrophy of humeral head, regeneration following bone transplantation and active use
  Case V —Congenital absence of scaphoid, deformity corrected and deficiency of tarsus repaired by transplanting bone into the space which the scaphoid should have occupied

November 6, 1916

BEFORE proceeding to the operations this morning I wish to explain in a general way the technic used in all open operations upon bones and joints I may say that the technic followed in this clinic is that outlined by Mr Lane, of Guy's Hospital, London, which I had the opportunity of observing eight years ago, and which I have followed religiously ever since It is as follows

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Whenever it is possible the part to be operated on is pre
pared for operation with a dry dressing for forty eight hours
previous to the time of operation This permits of the applica
tion of the tincture of iodin to a dry skin surface which I believe
is of great importance The instruments are sterilized in an
especially arranged tray and brought to the instrument stand
near the operating table without being dried They are then
covered with sterile towels The sponges are brought up from
the sterilizer in small wire baskets This enables one to minim
ize the amount of handling of instruments and sponges It
has been my plan to designate one assistant for each line of
work in these bone operations *for instance one assistant handles*
all sponges and a sponge is introduced into the wound only
once Another assistant ties all knots, which are tied at the
end of instruments In this way it is possible to carry out any
kind of a bone or joint operation without introducing anything
other than sponges and instruments into the wound This
method I believe is desirable and this belief is based upon the
results of about 100 open operations on bones and joints with
only one infection In that instance we were of the belief that
the infection was of hematogenous origin

The same plan of technic is carried out in the operation for
securing autotransplants After the incision is made over the
subcutaneous portion of the tibia the bleeding is stopped and
the wound well retracted using great care not to injure the
tibialis anticus muscle more than necessary When the incisions
are made the edges of the skin are well covered with towels
The desired length and size of the tibial transplant is marked
out by means of calipers and removed by means of an elec
trically driven saw The transplant is lifted with two forceps
in order to prevent the possibility of accident and introduced
into the place prepared for it and driven into place by means
of instruments The wound from which the transplant is re
moved is covered with gauze immersed in saline solution until
the transplant is put in place and the original wound closed
The entire wound is closed with chromicized catgut this material
also being used to close the skin layer Chromicized catgut

has been found to serve this purpose well since it is not necessary to remove the dressings until bony repair is complete This is of especial importance where it is necessary to apply plaster of Paris dressings The wound from which the transplant has been taken is closed with chromicized catgut and dressed in the same way

CASE I—DOUBLE HALLUX VALGUS

The technic just outlined will be followed in this case The incision is made just external to the extensor proprius hallucis tendon No part of the redundant skin is removed as experience has shown that as repair takes place the skin contracts to its normal condition In other words if the skin were taken away considerable contraction would result The incision is carried down upon the capsule of the joint The joint is now opened By means of a curved periosteotome the capsule and periosteum are separated from the outer side of the first metatarsal and the exostosis brought well up into the wound With the aid of retractors the capsule is separated widely so that the bony tumor can be removed using a straight saw without mutilating any of the surrounding tissues The sharp edge of the synovial surface of the joint is rounded by means of a rongeur forceps and the capsule previously prepared is now closed leaving the joint in practically a normal condition The outer half of the extensor proprius hallucis tendon is now drawn to the anterior and medial surface of the base of the first phalanx of the great toe and sutured to the base of the capsule just where it is reflected over the inner surface of this bone As healing occurs the stretch on this tendon tends to draw the toe into its normal position

During this entire operation you will note that considerable attention was given to the question of preventing even a slight hemorrhage This is done first because I believe it lessens the amount of pain from pressure and second and most important because it lessens the possibility of infection in these joints The wound is now closed with chromicized catgut which is left in until the wound is entirely healed Such suture material obvi

ates the necessity of removing the cast in order to take out the
stitches at the end of the seventh or eighth day This is only
a small point but it is one that I believe minimizes the possi
bility of infection of the skin because of the unnecessary handling
of the wound until the skin is completely healed This is thirty-
day chromicized catgut The wound is now closed You will
note that I have been able to remove the exostosis without
coming in contact with the wound except through the applica

Figs 161 162 —Hallux valgus a typical case

tion of instruments and sponges which have been taken directly
from the sterilizer The wound is now dressed with subiodid
of bismuth powder and several layers of gauze dressing being
particular to place a sponge between the toes which tends to
correct the malposition of the great toe A plaster of Paris cast
is now applied extending well over the end of the toe and cov
ering the entire foot up over the ankle

We will now operate the right foot which will be handled
in the same way as the left In connection with the operation

just performed I believe it is much more important to get the work done aseptically than it is to follow any particular line of technic   However, the results in the hallux valgus cases have been very gratifying to me, especially since I have operated on a fair number of cases   These patients are instructed after leaving the hospital to dress the toes in the manner described above, and for at least six months to wear a shoe fairly wide and long

Figures 161 and 162 show the type of case just operated on and are x ray pictures of a case previously operated on by me

CASE II—FRACTURE OF THE FEMUR TREATED BY MEANS OF AN AUTOTRANSPLANT

This patient, a woman of fifty nine years, fell ten days ago, sustaining an intracapsular fracture of the neck of the femur Several years ago in connection with operative surgery on the cadaver, I worked out a plan of incision to be followed in operations for the reconstruction of the hip joint, which is as follows

The incision begins 1 inch below and a little external to the anterior superior spine, and is carried backward to a point just above and behind the great trochanter, and then downward on a line corresponding to the posterior surface of the femur (Fig 163)   I am following this plan in the case before me The incision is now carried through the tensor fascia femoris, and by separating the fibers of the gluteal muscles as nearly as possible the incision comes down on the neck and finally the great trochanter, which is the landmark used for approaching the capsule of the hip joint   The difficult feature about this whole operation is the depth at which it is necessary to work without introducing the hands into the wound   I am now opening the capsule of the joint on its anterior part   A bloody fluid is escaping with a few fragments from the neck By referring to the accompanying x ray picture it is readily seen that this is a comminuted fracture (Fig 164)

Now by holding the split portion of the capsule open one is able to see the torn portion of the capsule dipping down between

and separating the bony fragments The pathology presented
here shows how difficult it would be to get bony union without an
open operation I want those near the operating table to see how
the capsule lies between the fragmented ends of the bone I have
now lifted the torn portion of the capsule from between the bony
segments With a lion jawed forceps on the great trochanter
I am able to rotate it forward sufficiently to bring the head of
the bone in line with the fractured neck The periosteum just
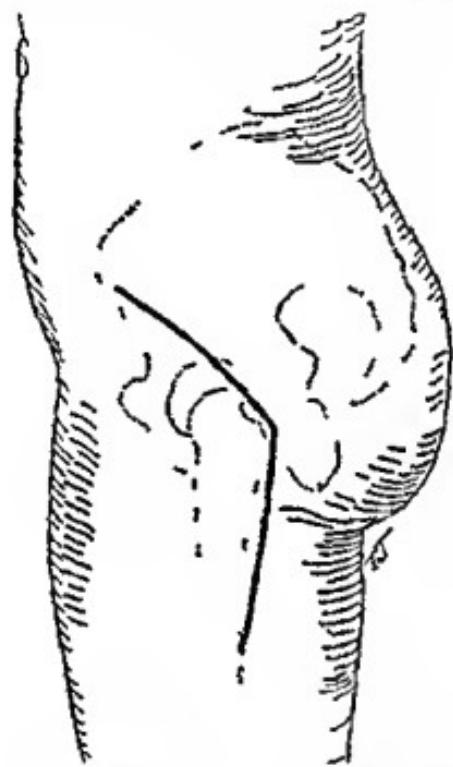
F g 163 —Incision for exposure of the h p-joint

below the great trochanter on the external surface is removed
and with a long electric drill especially made for this purpose
I am making an opening through the compact portion of
the femur to allow me to make the remainder of the groove
through the cancellated portion of the neck with the Murphy
doweling instrument as the groove through this portion of the
bone is made more accurately with the hand driven instrument
than with the electric drill As soon as the instrument passes

the line of fracture into the head you will note the head is fixed upon the shaft just as I wish to fix it with the bone transplant. The groove is now well up into the head of the femur and ready for the reception of the graft. The length is 4¼ inches which I will now mark on the skin of the tibia of the same leg.

Fig. 164.—Comminuted fracture of the neck of the femur before operation

An incision 7 inches in length is now made over the subcutaneous part of the tibia and the skin edges well retracted. A transplant 4½ inches in length by ½ inch in width down to the marrow is now taken. This transplant will fit the groove made in the head of the femur rather snugly which is the condition I wish to produce as that will secure the head more tightly to the neck of

the femur I am now driving the transplant into the prepared bed and you will notice that it goes up nicely into place The transplant is now in place I am retracting the capsule so that you may see the head moving with the femur which fits very solidly in place All points of bleeding are tied off The capsule is now closed with chromicized catgut The muscles are allowed
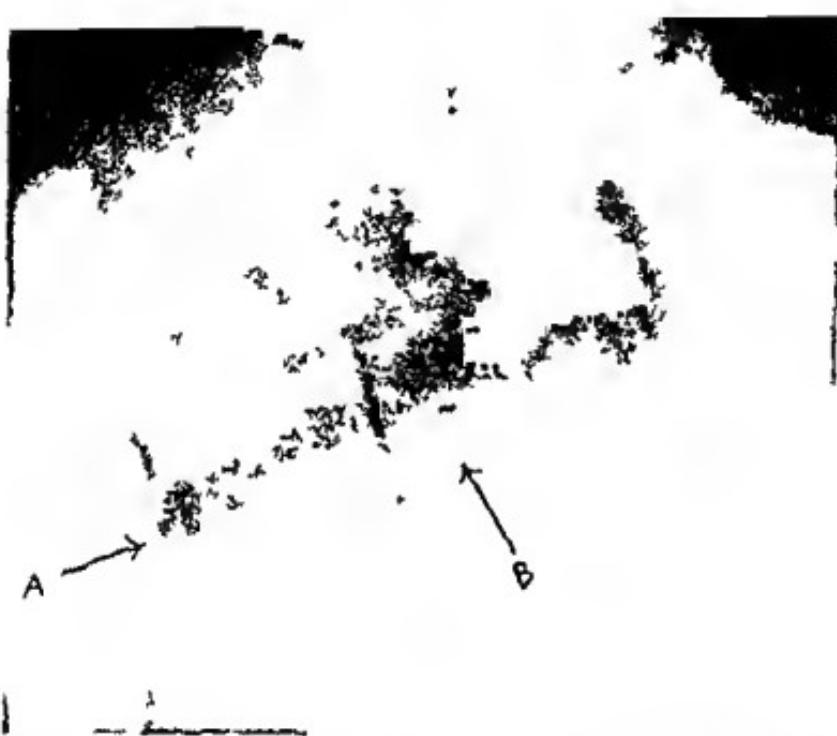
Fig 165—Complete reduction of the fracture A The autogenous tibial transplant holding the head in place (note that the greatest width of the transplant has been put in the vertical position as in this position it supports the greatest carrying weight) B Line of fracture

to come together with a few mattress stitches of catgut The tensor fascia femoris is now closed The skin is closed with chromicized catgut and the wound dressed as in the previous case much dressing being placed over the trochanter and over the site from which the tibial transplant was taken

We are now removing the patient to the x ray room in order

that an x-ray picture may be taken before applying the cast. The limb is now thrown into a well abducted position by means of a traction apparatus and dressed in this position with a plaster-of-Paris dressing. The cast over the leg is split within three hours from the time it is applied. The accompanying x-ray picture, which has now been developed, shows a perfect reconstruction of the neck of the femur (Fig. 165).

CASE III.—TUBERCULOSIS OF THE FIRST PHALANX OF THE SECOND FINGER

This is a case of tuberculous osteomyelitis of the shaft of the first phalanx of the second finger. The disease is of two
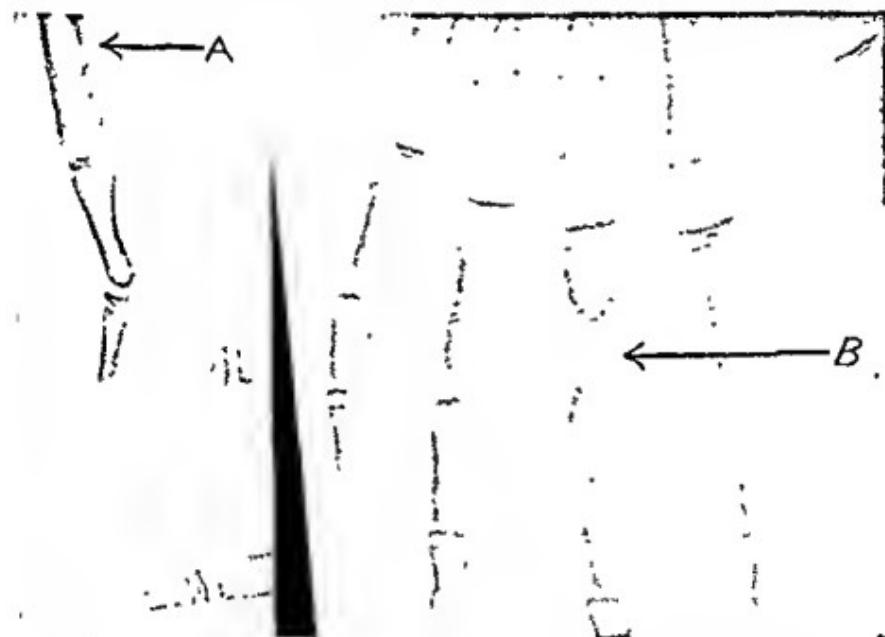
Fig 166 —Tuberculous osteitis *A*, Side view. *B*, Anteroposterior view.

years' standing, with lateral sinuses communicating directly with the skin surface, as is well shown in the lateral view of the finger in the accompanying x-ray plate (Fig. 166, *A* and *B*).

Against the generally accepted rule, which forbids the transplantation of bone into an infected region, I am carrying out the transplanting plan, owing to the fact that it seems the only practicable way of splinting this finger and thereby preventing

contracture   The same plan of technic is followed as in the
previous cases   The incision is made over the dorsal surface
of the affected part and then carried down upon the bone
The skin is well retracted   The bone is removed at a safe dis
tance on either side of the disease   As shown in the accompany
ing x ray plates enough of the shaft is left at either end so that
I am able by means of a Murphy doweling instrument to
place the intramedullary bone splint into place without injuring
the epiphysis (Fig 167)
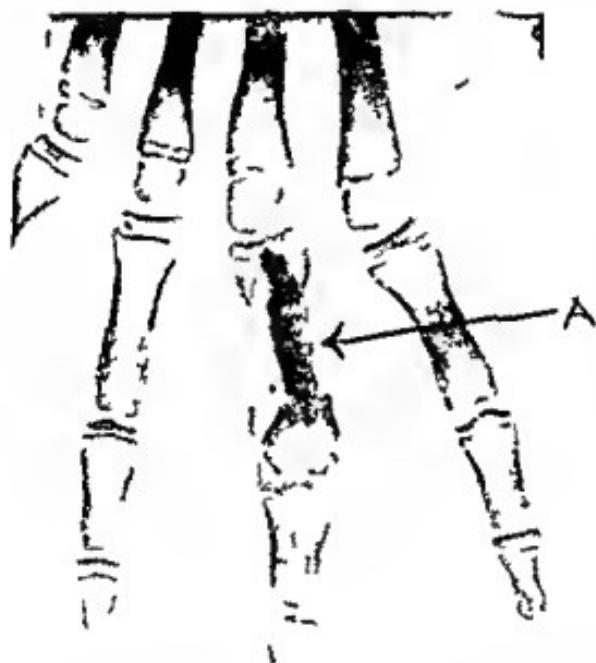
Fig 167 —Transplant two and a half months after operation completely healed in

I am now removing the autotransplant from the left tibia
It is 1¼ inches in length and ¼ inch in width and thickness   It
is made with a small shoulder on each end   which will slip up
against the corresponding portion of the shaft of the phalanx
You see how nicely this splints the finger   The wound is now
closed and dressed on a single splint for this finger   in order
that the sinuses on either side of the finger may be dressed from
day to day   This case will be watched and the result reported
at a later date

January 25, 1917.

I wish to demonstrate the following cases which have been operated on within the last few months so that we may see the results of the operations

CASE I

The first case is that of tuberculosis of the first phalanx of the middle finger operated on November 6, 1916 The sinus

Fig 168—Complete bony ankylosis Before operation.

which was present at operation cleared up after several weeks' treatment The case is presented today with the accompanying skiagrams which show the progress that has been made It will be noted by examining the x-ray plate (Fig 168) that new bone is being laid down between the shaft and the transplant at each end and about the entire transplant The interesting fact in this connection is the presence of the original

transplant still intact and taking the place of the former shaft
of the bone throughout showing that the transplant at least
temporarily acts not only as a bridge work for the new bone
but also as a supporting shaft as is shown by the stability of
this finger The movements of the finger are practically the
same as in any of the other fingers of that hand

One other interesting feature in connection with the trans
plantation of bone into this infected area which as I said before
was carried out because there was no other plan by which this
finger could be splinted and contracture prevented is that auto
transplants may have a greater tolerance for infection than
we originally supposed This patient has been asked to report
to the x ray department every month for the next year in order
that a study may be made of the growth of bone within the
transplant

CASE II—ARTHROPLASTY FOR ANKYLOSIS OF ELBOW

Patient a young woman twenty five years of age married
two years Ankylosis is of Neisserian origin The operation was
performed four and one half months after the ankylosis began

In connection with the general plan of arthroplasty I am
of the opinion that in those cases where the etiologic factor is
the Neisserian type of infection it is well to do the operation
fairly soon after the ankylosis begins I base this opinion upon
the fact that there is not the same tendency for recurrence of
the infection since the culture medium necessary for the growth
of this organism is synovial surface and since this is entirely
destroyed by the disease itself and removed during the time
of operation there does not seem to be the same danger of
lighting up a latent infection that there might be in an ankylosis
with other forms of organisms as the etiologic factor Any one
who has had any great amount of experience with fractures
and dislocations of the joints knows how rapidly especially
in the elbow joint contractures of the surrounding soft parts
take place and how distressing they are to manage It has
occurred to me that if it is possible to perform the operation
of arthroplasty before this contraction in the soft tissues about

the joint is complete, much time and pain would be saved in re-establishing the normal range of motion to the joint. In two recent cases of this type operated on in this clinic the results have been so good as to make me an enthusiastic believer in early operation on ankylosed joints where Neisserian infection is the etiologic factor in producing the ankylosis.

The accompanying drawing (Fig. 169, 1 and 2) shows the method of making the flap. The internal flap has its base above the internal condyle, with the line of incision as shown in the drawing, and its posterior edge running down, taking the fat and fascia covering the pronator radii teres, the flexor carpi ulnaris, the palmaris longus, and flexor carpi radialis. In other words, the entire flexor group of the hand which originates from the internal condyle. Great care must be exercised in removing the fascia overlying these muscles in order to minimize the amount of trauma to the muscles themselves. The external flap is made with the base downward, and is taken from the fascia overlying the upper part of the supinator longus. This is a short flap and is utilized only to cover the head of the radius. After making the incision the ulnar nerve is exposed and very carefully retracted to one side by means of gauze, and the bone removed by means of an arthroplasty chisel. Enough bone between the sigmoid fossa and the condyles of the humerus is removed to give a centimeter's space, and a corresponding amount of bone is removed between the synovial surface of the external condyle and the head of the radius. The tip of the olecranon is removed in order that extension may be made complete. This amount of space is sufficient to permit the long internal flap, already described, to be placed over the internal condyle, pulled through over the external condyle, and attached to the external fascia over the external condyle, as shown in Fig. 169. The base of the internal flap, in addition to covering the internal condyle of the humerus and the articular surface of the olecranon process, is also used to form a fascial sheath for the ulnar nerve, thereby protecting the nerve from injury in the healing process of the joint. The external flap is now tucked around what remains of the head of the radius,

ULNAR SIDE

RADIAL SIDE

Long flap from ulnar side
brought then and sutured well
over end of humerus.

Smaller flap from radial
side fastened over end of
radius.

Fig 169, 1, 2 —Source and arrangement of flaps in arthroplasty on the elbow.

and the tip of this flap is attached in the depth of the wound
to the internal flap which has already been put in position.
This is shown in Fig 169, 2.

The wound is closed in the ordinary way and dressed in extension with an ordinary 5 pound weight. Slight passive movements are begun about the seventh or eighth day, and these movements are kept up daily, encouraging at the same time active movements until the patient is able to control the movements of the arm.
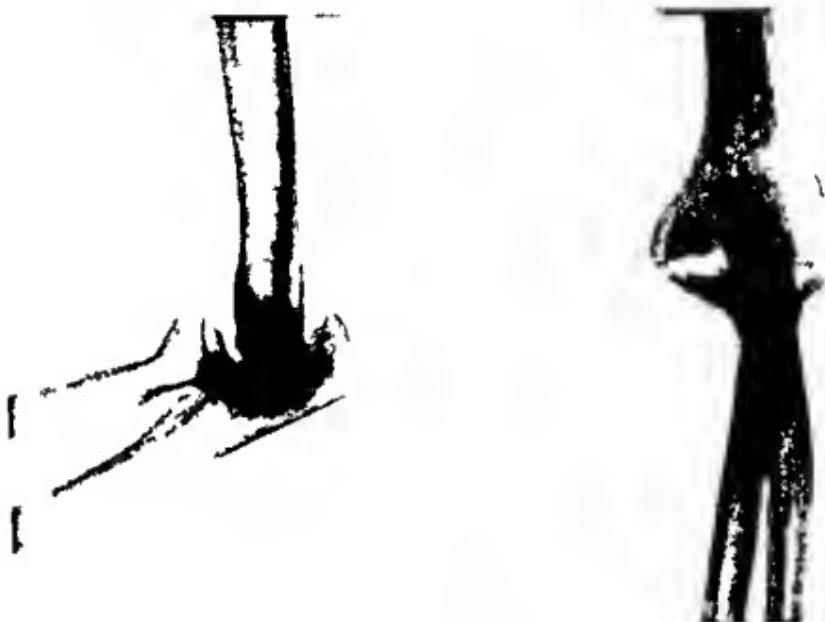
Fig 170 —Several months after operation   Normal mobility

This patient is presented today in order to show the amount of extension and flexion she possesses. You see that the range of motion is practically normal. She is able to put her thumb on her shoulder which shows the degree to which flexion has been obtained. Extension is practically as complete in this arm as in her left. The patient is able to do practically as much with this arm today as she was before the disease occurred. (Compare Figs 168 and 170.)

CASE III —DOUBLE DISLOCATION OF THE SHOULDER

Mrs B aged twenty three years. This is a case of double dislocation of the shoulder following what is reported to have

been an epileptic seizure The interesting fact in connection with this case is the occurrence of these dislocations without the history of a fall or a sudden jerk on the hyperabducted arm such as we usually get The dislocations are apparently the result of muscular action Case was reported to me four months after this condition occurred Upon examination there was found the characteristic signs of a downward dislocation
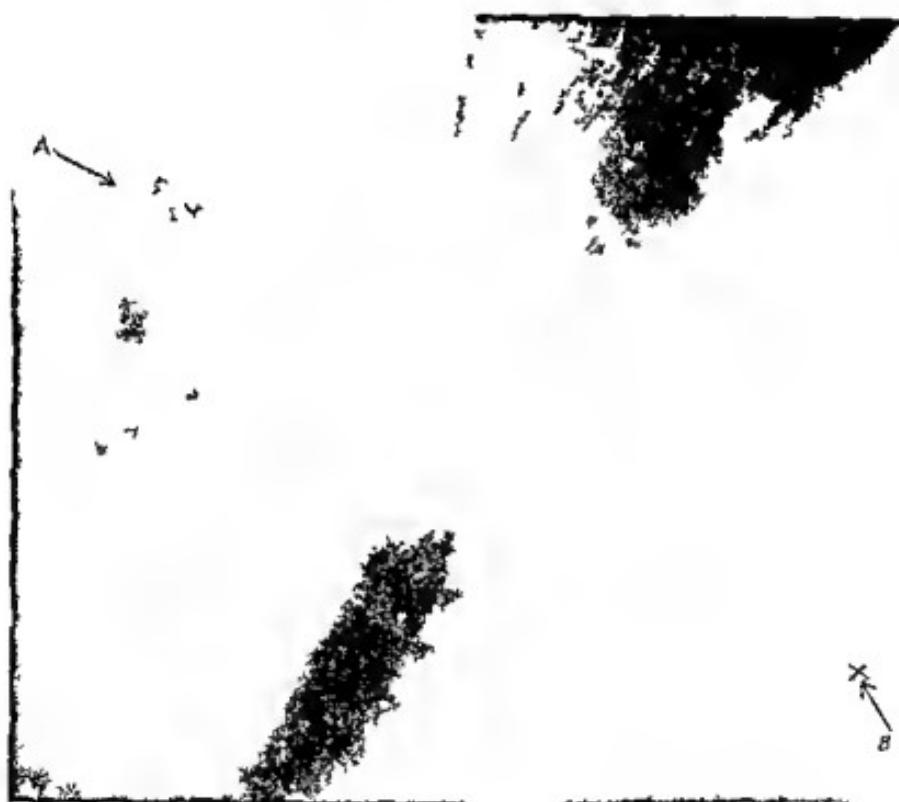
Fig 171—A and B vacant glenoid cavity on right and left sides respectively

of both shoulders into the axillary space with marked atrophy of the deltoid muscles In fact the diagnosis of dislocation was made because of the disturbance in these muscles The accompanying x ray pictures taken before the patient was operated on show fracture of the anatomic neck (probably pathologic fracture) and marked atrophy of the heads of both bones Figure 171 A shows the vacant glenoid cavity on the right side and Fig 171 B the same condition on the left side

Owing to the fact that the degeneration was more marked in the head of the right humerus than in the left, and because of the hope of giving the patient some service in her right arm, it was decided to operate on that shoulder first.

On opening what remained of the capsule of the joint the head was found devoid of circulation, a type of dry necrosis

Fig. 172.—Degenerated head of humerus immediately after reduction

having occurred. The head was soft and resembled very much a dead gourd that is found in the garden in summer, which when you compress it crumbles and breaks. In fact, the synovial portion of the head of the humerus was so soft and crumbled so easily that I felt very positive that, whether I took it out or not the patient was going to have a flail joint. If it were left

in it would very likely produce a sinus and continue to discharge
necrotic bone until the head was resected It is known that when
a bone is out of its normal position sufficiently to disturb its
blood supply, degeneration takes place, while if it is replaced
before degeneration is complete, the added nourishment may
be sufficient to cause marked regeneration

Fig 173 —The same joint marked regeneration of the head of the humerus four
months after operation

Following the instructions laid down by Dr Murphy it
was decided to manipulate the head as little as possible and
return it to what remained of the glenoid cavity by attaching
what remained of the capsule to the under surface of the glenoid
This held the head very well in place The capsule was then

brought together, the wound closed, and the patient dressed in the ordinary way (Fig. 172). Slight movement was started within two weeks. The accompanying x-ray pictures show the degree to which regeneration has taken place, and the function of the arm as displayed by the patient shows a shoulder practically as serviceable as that possessed by any ordinary individual. Figure 173 shows the marked regeneration of the head four months after operation.

The left shoulder was not operated on until one month after the right, and was found to be a much more difficult problem to handle because of the formation of fibrous tissue and the contraction that had taken place. The adhesions were so firm that it was nearly impossible to get the head, which had been broken and healed out of position, back into anything like its normal position This also has given a very good result, and while there is some deformity owing to the fracture of the anatomic neck of the humerus, it is nevertheless a very good-looking shoulder, and she is able to use the left arm very nearly as well as the right.

The interesting feature about this case is the fact that the head of the humerus placed back in its normal position seems to have regenerated.

CASE IV.—FRACTURE OF THE HUMERUS: BONE TRANSPLANT

Mr. V, carpenter, sixty-four years of age, came to me five months after his original injury, which occurred in falling off a scaffolding The entire head of the humerus, as shown in the accompanying x-ray picture (Fig. 174), was markedly atrophic The upper end of the shaft was comminuted, and at that time what remained of the surgical neck pointed outward and upward, with a great deal of absorption and degeneration of the head of this bone A false joint had formed between the side of the surgical neck and the broken distal end of the shaft.

After explaining to the patient the possibility that if we operated we might fail to obtain union because of his age, he was still desirous of having the operation performed because

in it would very likely produce a sinus and continue to discharge necrotic bone until the head was resected. It is known that when a bone is out of its normal position sufficiently to disturb its blood supply, degeneration takes place, while if it is replaced before degeneration is complete the added nourishment may be sufficient to cause marked regeneration.

Fig 173 —The same joint marked regeneration of the head of the humerus four months after operation

Following the instructions laid down by Dr Murphy it was decided to manipulate the head as little as possible and return it to what remained of the glenoid cavity by attaching what remained of the capsule to the under surface of the glenoid This held the head very well in place The capsule was then

rontgenograms show the position of the head and shaft of the bone before operation (Fig 174) The next picture (Fig. 175) shows the transplant in place and the new bone bridging the defect.

Fig 175 — After operation   At A and B are seen the upper and lower ends of the transplant

The patient was discharged from the hospital within three months of the time of operation, and at that time started doing light work which required the use of both arms This he con-

tinued to do for eighteen months until December 20 1916 when he fell and injured this same arm and is here today in *connection with the dressing of this recent injury* A rontgeno gram (Fig 176) taken a few days before his last injury shows

F g 176—Rontgenogram taken a few days before last injury sho s ho v completely the fracture had healed and the head had regenerated

how completely the fracture has healed and the head of the humerus has regenerated

CASE V—CONGENITAL ABSENCE OF SCAPHOID REPAIR BY BONE TRANSPLANTATION

M M a boy of six years came to the hospital with a marked deformity of the left foot and leg an atypical talipes equi

novarus   This patient apparently had been neglected in his

Figs 177, 178.—Before operation   Note the entire absence of the scaphoid and the dislocation forward of the outer end of the astragalus with an exostosis growing out of posterior surface of os calcis at the site of attachment of tendo achillis

early life, no attention being paid to his condition, so that when he presented himself at the hospital he hobbled along on his

that way we can estimate the fate of the autotransplant   A
law has been laid down in connection with the reconstruction
of bone to the effect that if an autotransplant is placed in con
tact with two living osteogenetic centers regeneration takes
place   It will be of interest clinically and scientifically to note
whether this transplant will absorb or continue to grow into a
new bone because of the function placed upon it substituting in
a space made vacant by the congenital absence of the scaphoid

CLINIC OF DR FREDERICK G DYAS

COOK COUNTY HOSPITAL

OPEN TREATMENT OF INFECTED WOUNDS

Summary Dakin s solution Wright s solution type of wounds in which they are desirable and how to use them illustrative case open treatment of burns— 2 cases theory and results of the method

October 28, 1916

WE have 3 cases for demonstration today   They will give you some idea of the results obtained by the so called open treatment of infected wounds   The closed method of treating wounds has been considered an economic necessity and has been carried on from the earliest times but the present war has emphasized the fact that this old method of wound treatment is entirely inadequate   The infections in wounds received on the battle fields during the present war are of exceptional virulence   As a result it has been found necessary to abandon the methods used in the Boer the Spanish American and the Russo Japanese wars the only wars that have been fought since the advent of the science of bacteriology   and to return in a measure to the procedures of the pre antiseptic days with one noteworthy addition   During the Franco Prussian War all infected wounds were opened as widely as possible and kept open   Today we irrigate these widely opened wounds either with Dakin's solution or with Wright s physiologic solution   Dakin's solution is made as follows

Dissolve 140 grams of dry sodium carbonate in 10 liters of water   200 grams of chlorid of lime are added to this   The mixture is then filtered through a plug of cotton, and to this are added 40 grams of boric acid   This solution is good for use up to one week   After that time it is not to be used

Coincident with the coming out of Dakin's solution came Wright s famous article on the "Physiological Treatment of

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Infected Wounds   He considered the treatment of wounds under three headings   First the anatomic method second the physiologic method and third vaccine or serum therapy   The physiologic method consists in making the freest possible incisions leaving the wound widely open to the air and sunlight with a thorough use of a so called lymphagogic solution   This solution consists of equal parts of 5 per cent sodium chlorid and ⅔ of 1 per cent of sodium citrate   Its purpose is to keep the pus from congulating thereby promoting drainage   Wright had previously demonstrated that normal salt solution produced an active local leukocytosis and that a 5 per cent salt solution caused less active leukocytosis   A solution of salt not as strong as a normal salt solution produced no active leukocytosis   This solution was called lymphagogic solution because Wright was able to demonstrate an increased flow of lymph from the tissues and a preservation of the fluid state of the wound secretions and thereby a continuous washing out of the wound under its influence   This solution is used as is Dakin s solution not in the time honored manner of wet dressings but by continuous or interrupted irrigations and by immersion in baths   It is incumbent upon us when treating infected wounds to discard any dressing which dams back discharges or macerates tissues   These pitfalls are avoided when using the open method by careful regulation of the amount of irrigation and the duration of the baths   By the use of Dakin s solution many of the most intensely infected wounds the type for which it is especially designed become clean in from four to ten days   (Note chart from Dr Carrel incorporated in Clinic by Dr Carl Beck p 143 of the February 1917 number—Ed)   As soon as evidences of sepsis have disappeared the solution is discontinued and the edges of the wound coapted by strips of adhesive plaster or by skin clips   In dressing our wounds a cradle is placed over the wound surface and mosquito netting is draped over the cradle to prevent infection by flies (Figs 181 and 182)   Contamination by atmospheric air we have proved to our own satisfaction is negligible

As an example of the practical use of Dakin s solution let us

Fig 181

Fig 182

Figs 181 182 —Open treatment of infected wounds The wounds lie exposed to the air protected only by a coarse wire screen or a piece of mosquito netting supported by a framework made from barrel hoops Fig 181 infected appendectomy wound Fig 182 infected wound of foot

consider the case of this man who was admitted to the hospital on Sept 23 1916 presenting a severe cellulitis of the leg The history we get is that one week prior to his admission he came

home from work complaining of general malaise The same night
he had a chill which lasted almost all night and his temperature
was very high He thinks that once it reached 105° F The
next day all the pain localized in the right leg which gradually
became swollen and inflamed He called in a physician who made
an incision on the median surface of the leg and expressed a little
pus Since then it has been about the same

His past history is unimportant and he denies venereal history

At the time he came in the right leg was markedly swollen
and reddened from above the knee to below the ankle pitting on
pressure and in many places there was a blistering of the skin
but no definite localization of the pus An incision about of 1½
inches long was made and a gauze drain inserted Subsequently
other incisions were made and the pus expressed and drainage
tubes introduced and later on the tissues on the median side of
the calf of the leg all sloughed off the muscles of the calf hanging
loosely through the open wound There were large masses of
necrotic tissue that kept up a foul discharge through the sinus
and there was marked inflammation about the internal malleolus

The wound was then treated by the open method which we
have just described You can see how these muscles herniated
through the skin incision This was a horrible stinking ne
crotic mass It looked as though it would be necessary to do an
amputation We began treatment with Dakin's solution An
upright was erected at the foot of the bed and on top of the up
right a receptacle holding about 1 quart of the solution was placed
and connected by a rubber hose with the rubber drainage tubes
which went through this leg By this arrangement we were
able to maintain at will either a continuous or an interrupted irri
gation We chose the interrupted—four times a day at first and
now twice a day The muscles were held up as you see by ad
hesive plaster which was the only covering of the wound He
had no pain at all with this method of treatment He has not
been subjected to the discomfort of having the dressings taken off
every day and he is going on to a complete recovery except that
he will probably have to have some skin grafting in order to cover
over that denuded area

I wish to show the next 2 cases as examples of another type of infected wound which is also best treated without the direct application of dressings

This patient, a man of thirty two years, a laborer by occupation, came into the hospital on October 3, 1916, complaining of extensive burns of his back and legs

One week previous to admission, while sleeping near an open fire his clothes caught fire and some minutes elapsed before he could throw the clothes off He felt some pain for a few days, but he was able to walk, he even slept on his back On the fourth day he went to bed and has been in bed ever since

The family history is unimportant as is the venereal history

Examination showed an extensive burn from about the level of the middle of the scapula down to the posterior aspect of the knee joints In spots there were islands of normal skin quite intact In other places an eschar, which has since been removed, In other places there was no evidence of skin forming underneath, but there was a light granulating surface

He was treated, as you see by the open method The bed-clothes are kept away from the wound by a cradle, as in the first case The crusts have been removed and the burns irrigated with a weak solution of aluminum acetate merely as an astringent wash I have asked him from day to day if he were in pain and he has replied in the negative He has been spared the torture of the frequent changing of dressings applied to that surface and is progressing very favorably His wounds may in some places require skin grafting but I think most of them will heal over

You remember we were taught in our text books of surgery that where one third of the cutaneous surface of the body is burned, death is likely to occur, even though that burn be superficial That was true with the old methods of treatment, but does not hold good with the present methods of the open treatment of burns Now you can see how clean that area is His temperature is normal, pulse 80, and his general condition is good His leukocyte count is 10,200 The urine is negative The intern says that some of these wounds have already healed

Our next patient is a Lithuanian twenty four years of age He came in on October 14th with first and second degree burns of the hands and face, but no one has been able to ascertain how he received them

They were handled just as in the previous case One striking point confronts us as we look at these wounds namely, their perfect cleanliness There is no evidence of pus As I stand close I cannot get the faintest odor of suppuration His temperature is 98° F and his pulse 72 He is not getting any absorption or he would have an elevation of temperature because to us as clinicians temperature can only mean one thing, namely, absorption of the products of infection As I have told you so often, do not deceive yourself by thinking the patient has a temperature because he has had too many visitors or because he has sat up a little too long That does not give him a temperature Fever is always the result of the absorption of the products of infection That is the only safe rule for you to follow as clinicians If we were able to interrogate this man—he speaks no English—we would find that he is not suffering any pain

It is a source of considerable gratification to me that I published my first article on the open method of treatment, as illustrated in these burn cases before it was published in Europe The method is right and there is no arguing against it when one has once seen the results The factors which led to the trial of this method were the following

Infection of wounds depends upon the growth of bacteria therein In order that they may develop, bacteria require three things—warmth food and moisture If deprived of a sufficient degree of any one of these elements growth becomes impossible The open treatment of wounds as exemplified in these burn cases, is based on the above fact We cannot refrigerate the wound *because by so doing we injure the tissues the tissues themselves* afford the pabulum for the bacteria therefore it is impossible to attack them from the standpoint of their food supply, the degree of moisture, however we can decrease, and this is best done by complete exposure of the infected surface to the air, and preferably, to a current of air such as might be produced by an electric

fan   Superficial wounds, such as these burns, may be dried out in this way and be rendered practically aseptic

One of the earliest advocates of this method of treating burns was Sneve, of Minnesota,[1] who tried it in a series of 85 cases Sneve summarized his experience as follows

"When first seen burns and, more particularly, scalds are apt to prove deceptive as regards their degree, and it is wise to withhold prognosis in the beginning   Whenever occlusive dressings are kept on, even for forty eight hours, I am confident that these will frequently convert a first into a second and a second into a third degree burn through confinement of the perspiration and maceration of impaired tissue   One of the remarkable things in this experience with burns is the small amount of pain suffered by the patients and its short duration when the wounds are left exposed to the air   Severe pain, when not obscured by shock, only lasts from six to twelve hours and I think is better controlled by hypodermics of morphin than by any other measure   I would urge that as little morphin be given as possible, it should not be given when shock is present

"Another astonishing feature is the character of the cicatrices after healing   In burns of the second degree the skin is reproduced so well that only a white color marks the scar   Third degree burns result in smooth flexible, skin like scars "   (Sneve has adopted a classification of burns according to which hyperemia of the skin is considered first degree, destruction of the epidermis shown by vesiculation, second degree, destruction of the derma, third degree, and of the deeper tissues, fourth degree) 'Two factors probably account for this   First, the top of granulations which grow into the meshes of the dressings are not torn off day by day, forming scar ridges throughout the substance of the scar, which firmly anchor the skin covering and probably interfere with its nutrition, and second, nature seems better able to control the growth of the firm small, healthy granulations which result from exposure to the air—a marked contrast to the large flabby efflorescent masses seemingly growing without direction in the moist chamber of an occlusive dressing   The length

of time for skin to cover a wound, judging from Wagner's and my own observations, is shortened about two thirds, as compared with the time required under occlusive dressings Wagner[1] es timates that a normal granulating surface the size of a saucer can be healed over in from eight to ten days

"First, treat the shock as indicated above (warm baths, room at high temperature, abundant saline per rectum, and by hypo dermoclysis combined with judicious use of adrenalin)

"Second, control the pain as necessary, and keep everything from contact with burned areas

"Third keep the patient surgically clean Ordinary surgical principles govern here as elsewhere, bichlorid of mercury, car bolic acid, and other strong antiseptics are to be avoided when possible, because they are such powerful cell poisons that toxic effects, both general and local are to be feared, the delicate cover ing of granulations will not stand escharotic action without inter fering with the production of smooth, flexible scars

"Fourth, give frequent cold spray baths to the sound skin, with friction, and keep room temperature high

'Fifth, cut away all blisters cleanse with normal salt solution, dry thoroughly, and dust all second degree burns with stearate of zinc carefully wiping away serous exudate until dry brown ad herent crusts are formed

"Sixth, leave third degree burns exposed without powder and keep surface clean until granulations are ready for skin grafting

' Seventh to maintain and to preserve function, body and limbs should be exercised as much as possible, the eschars of burns of fourth degree should be removed when nature so indicates and amputation should be performed when needed '

In the main I agree with Sneve I believe however that irri gation with a 2 to 5 per cent solution of aluminum acetate after removal of the crusts represents an advance over the Sneve method and that the use of an electric fan at a rate of speed suffi cient to maintain just a perceptible current over the exposed lesions may be of value in some cases In addition, severe burns in the neighborhood of joints may at times require special hand ling to prevent contractures

¹ Zentralblatt f Chir Dec 12 1903

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